Ceramic Abstracts Section, pp. 47-64 CERAMIC ABSTRACTS and THE BULLETIN, Vol. 22, No. 3, March 1943

CERAMIC ABSTRACTS and THE BULLETIN

OF THE

AMERICAN CERAMIC SOCIETY

APRIL 15, 1943

MONTHLY PUBLICATION DEVOTED TO THE ARTS AND SCIENCES RELATED TO THE SILICATE INDUSTRIES

FORTY-FIFTH ANNUAL MEETING PROGRAM

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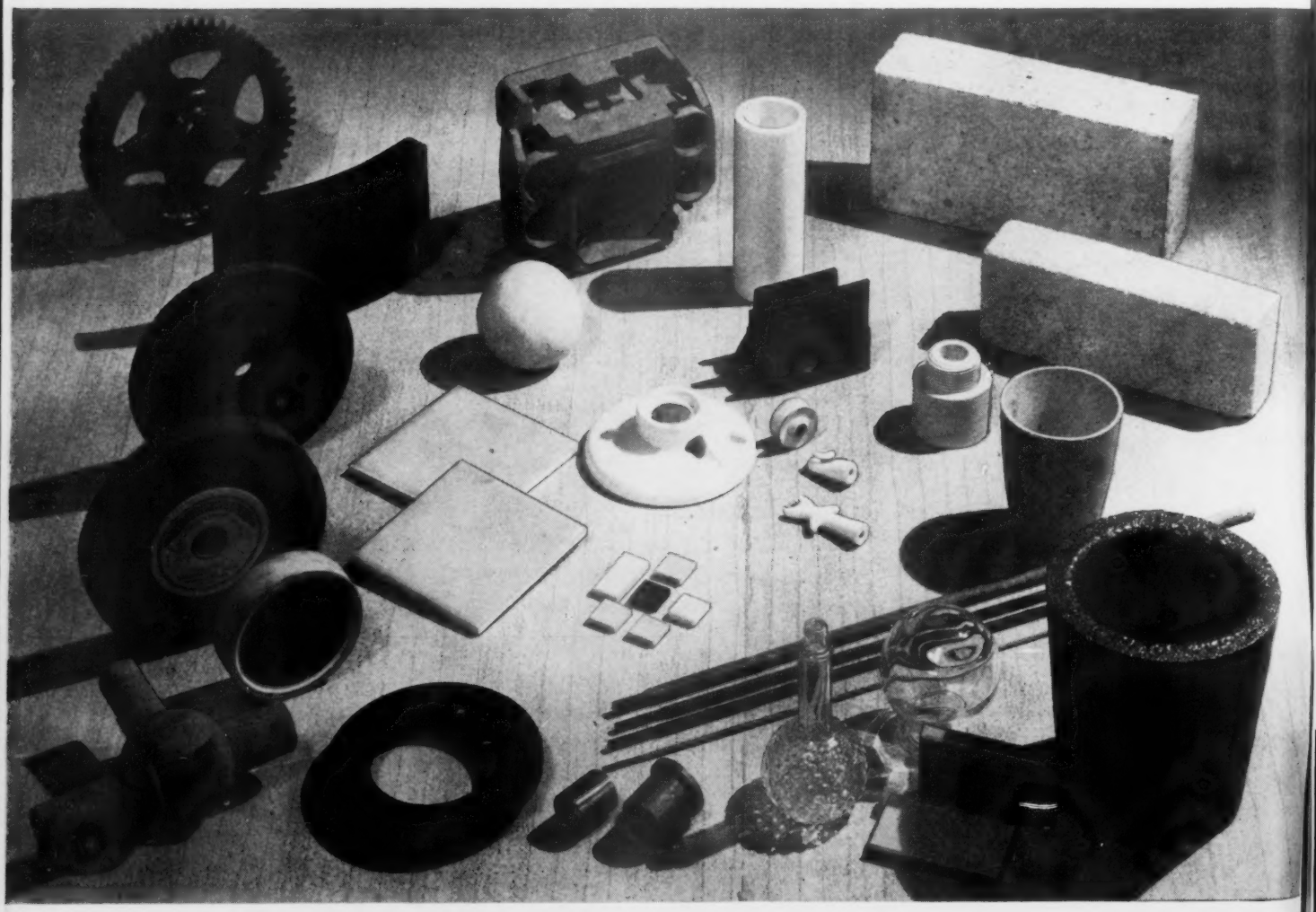

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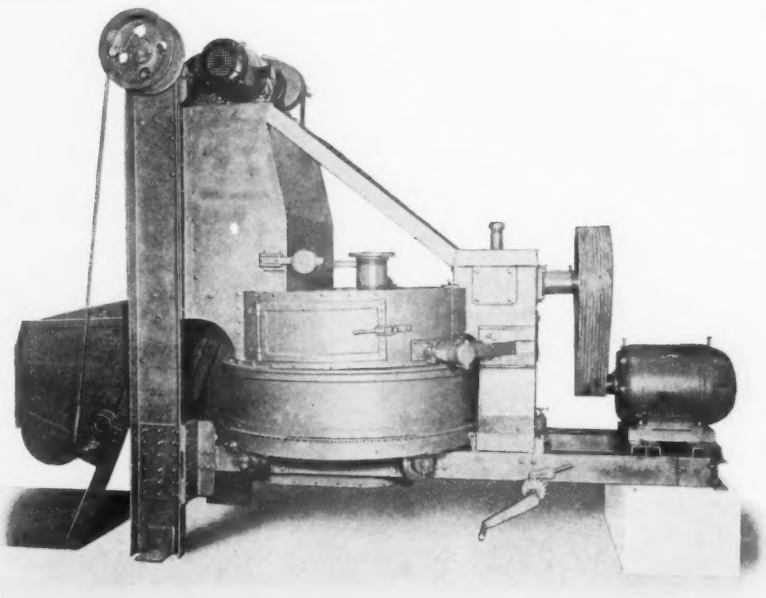

Symbol EAG-4 "Lancaster" Mixer, closed pan type with separately driven elevator hopper.

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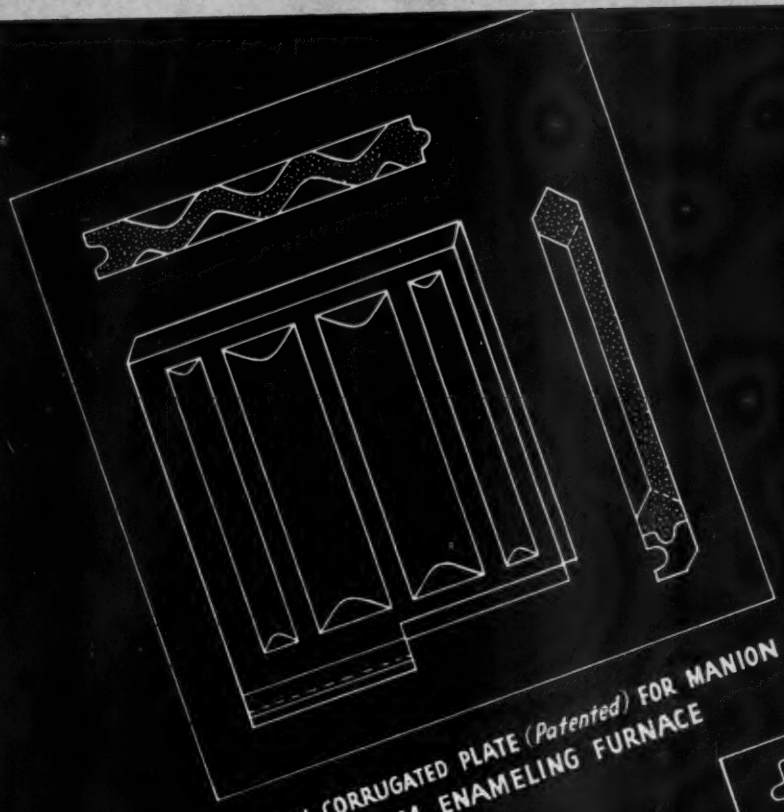

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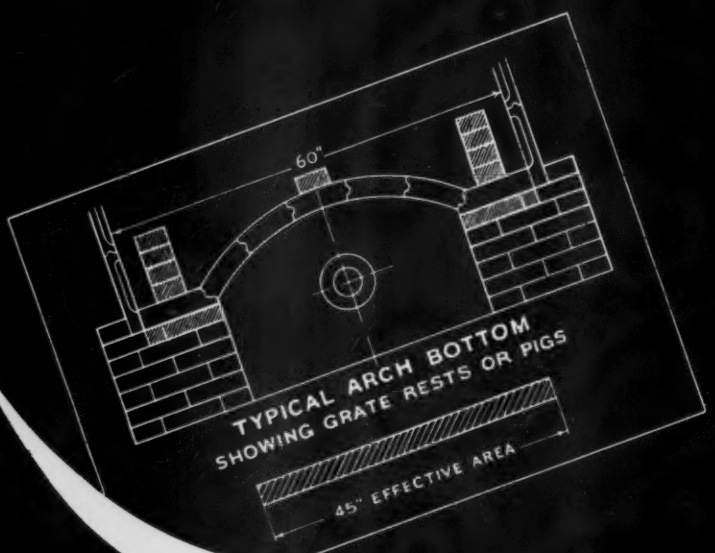

TYPICAL ARCH BOTTOM
SHOWING GRATE RESTS OR PIGS

SHAPE is important when considering refractories. Greater efficiency often is gained by constructing furnaces around suitably designed refractories, rather than vice versa.

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R-812

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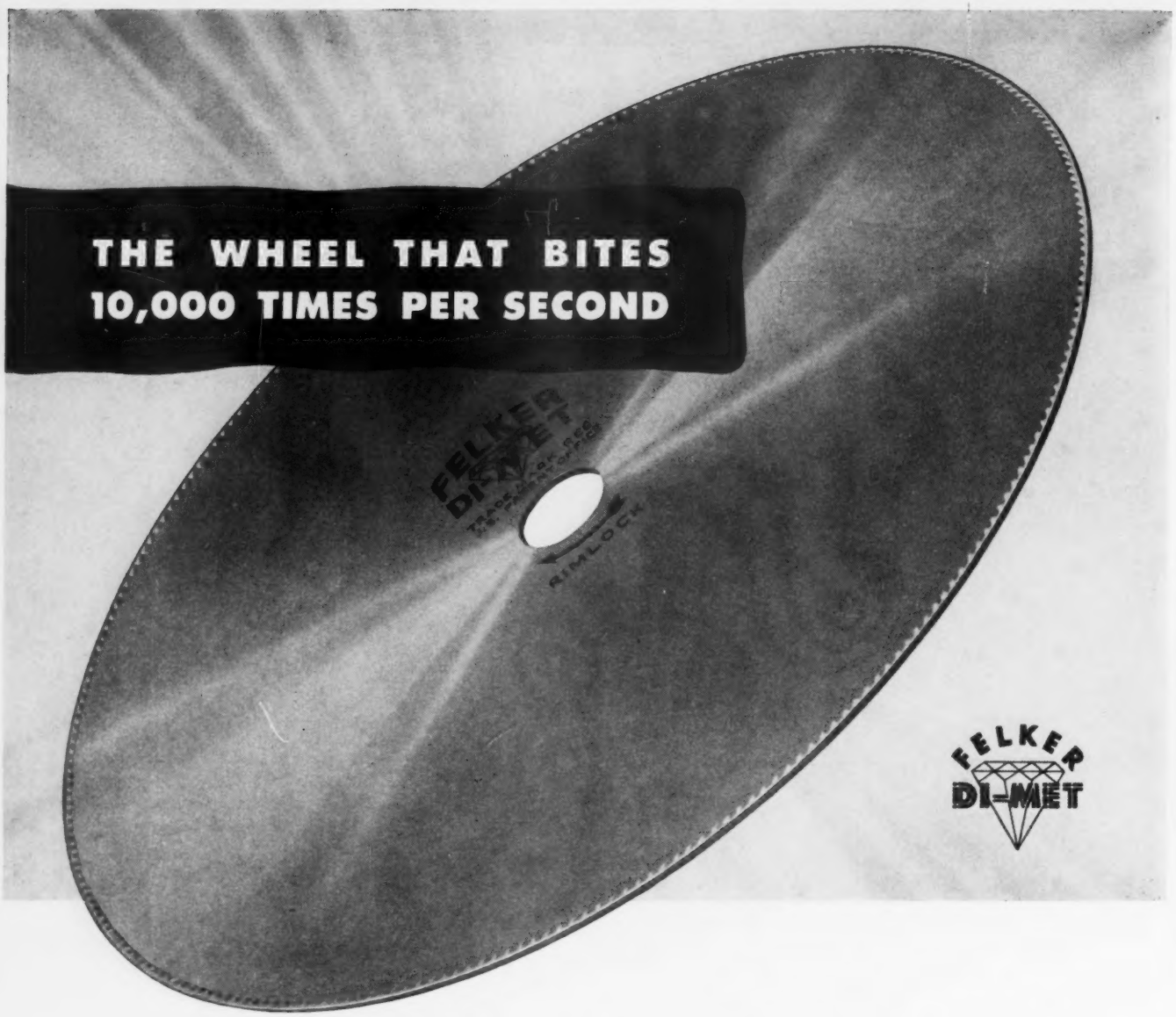

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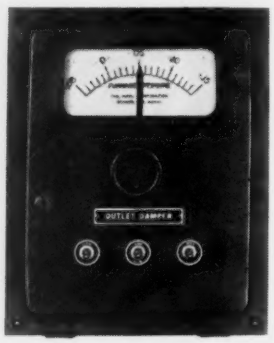

SPECIAL NOTE! Be sure to send for your Free Copy of Bulletin 42-552 "Instrumentation and Control of Ceramic Furnaces, Pottery Kilns, Glass Tanks and Enameling Furnaces."

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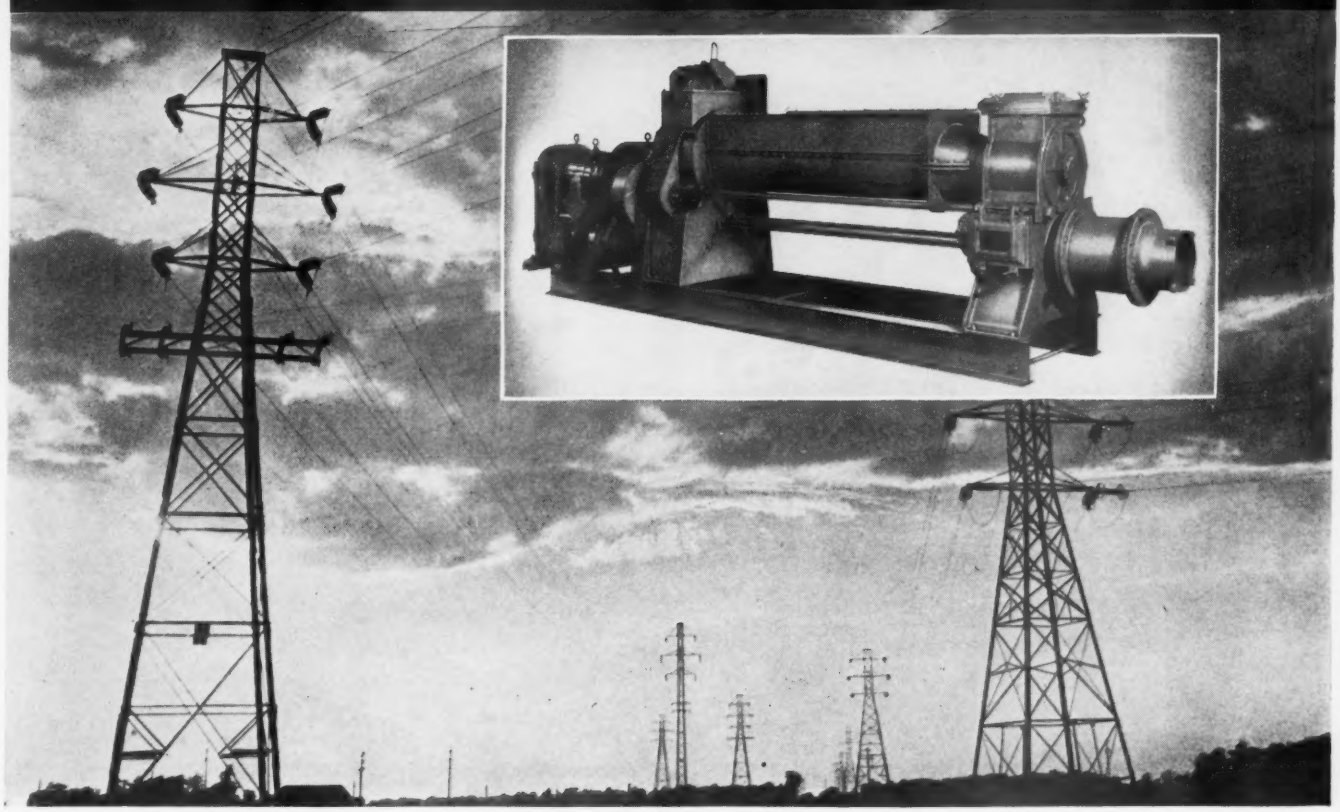

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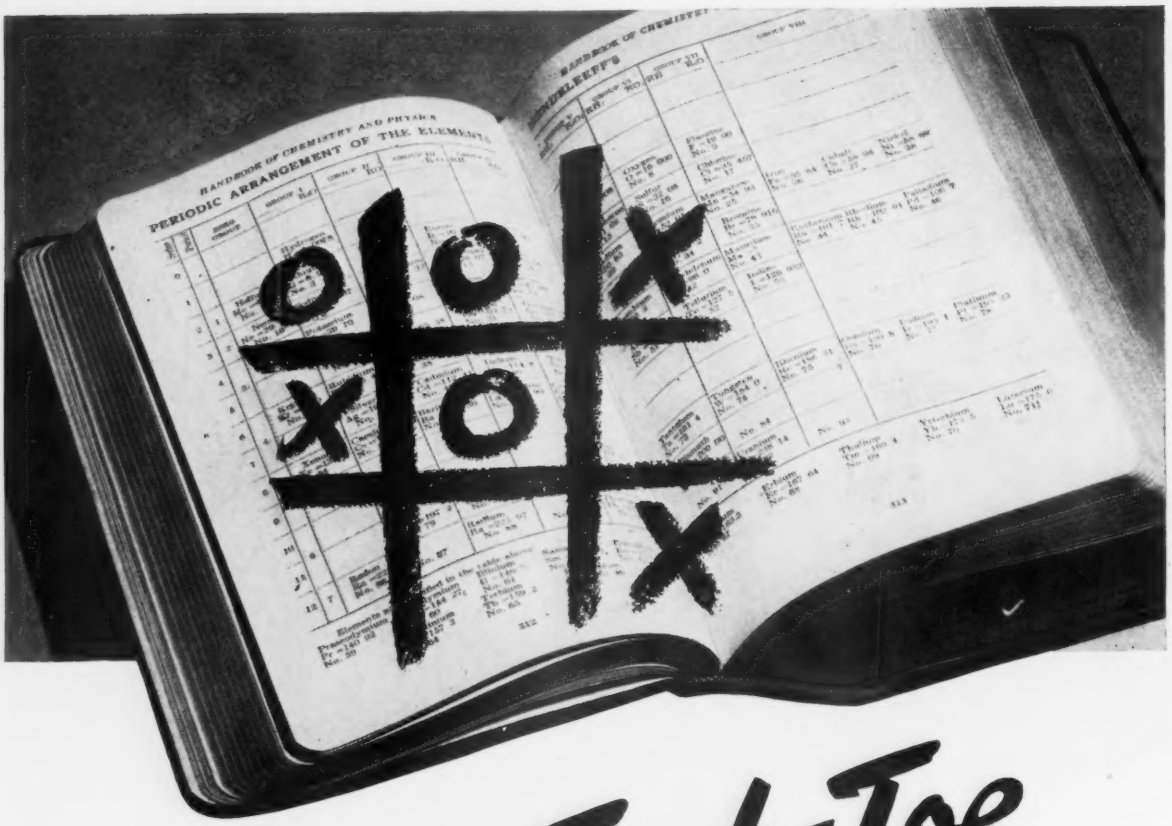

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Ceramic Chemicals
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Metal & Thermit Corp.
Pennsylvania Salt Mfg. Co.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Cerium Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Foote Mineral Co.

Chromite (Natural Chromate of Iron)
Ceramic Color & Chemical Mfg. Co.
Foote Mineral Co.

Chromium Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F. & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Clay (Ball)
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Potters Supply Co.
Spinks, H. C., Clay Co.
United Clay Mines Corp.
The Vitro Mfg. Co.

Clay (Bentonite)
American Colloid Co.
Ceramic Color & Chemical Mfg. Co.
Foote Mineral Co.
Great Lakes Foundry Sand Co.

Clay (Block)
Du Pont de Nemours, E. I., & Co. Inc., Electrochemicals Dept.

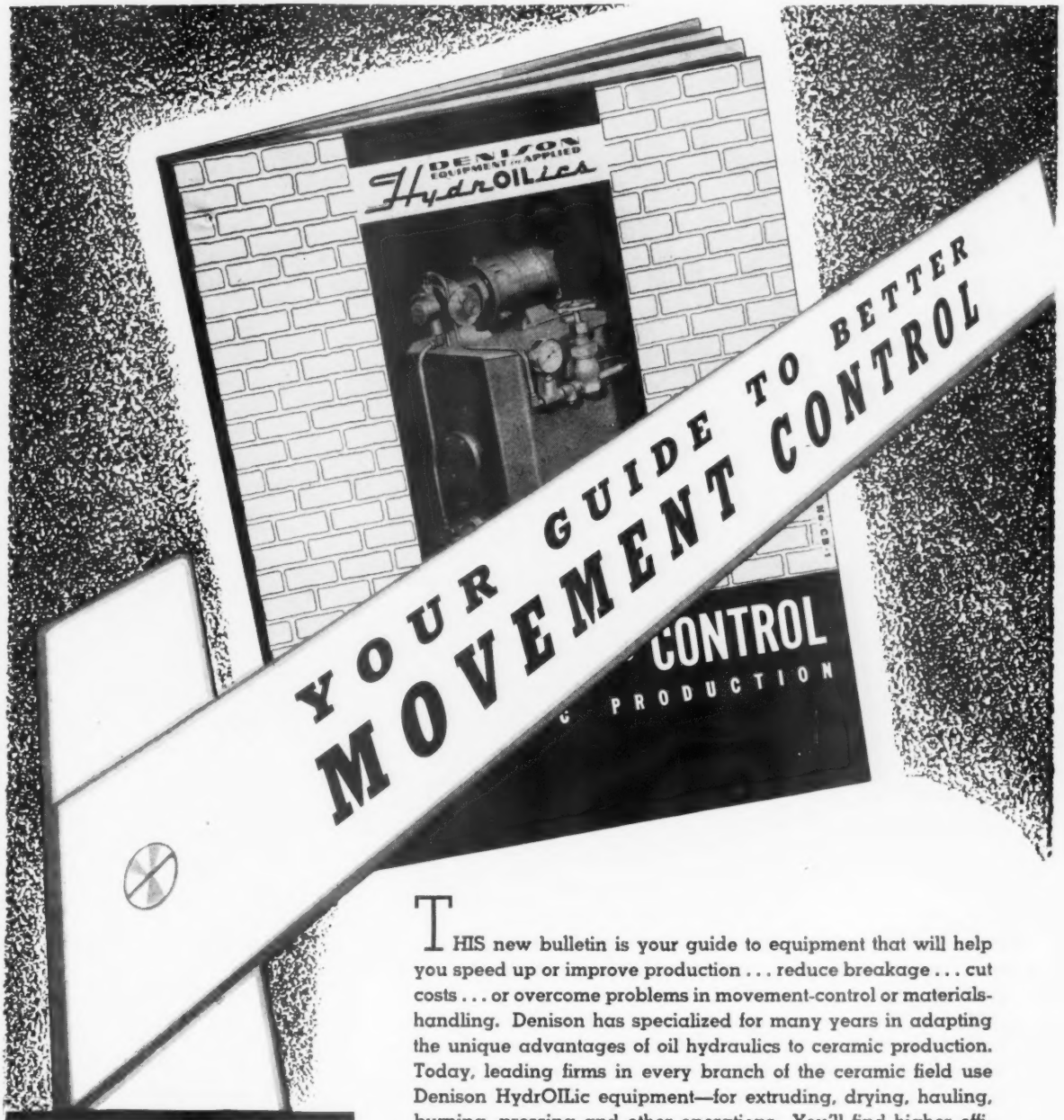
Clay (China)
Ceramic Color & Chemical Mfg. Co.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
United Clay Mines Corp.
The Vitro Mfg. Co.

Clay—Cleaners, Feeders
Lancaster Iron Works, Inc.

Clay (Electrical, Porcelain)
Ceramic Color & Chemical Mfg. Co.
Hammill & Gillespie, Inc.
The Hommel, O., Co., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay (Enamel)
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Metal & Thermit Corp.
Paper Makers Importing Co., Inc.
Porcelain Enamel and Mfg. Co.
Spinks, H. C., Clay Co.
Titanium Alloy & Mfg. Co.
United Clay Mines Corp.
The Vitro Mfg. Co.

Clay (Fire)
Great Lakes Foundry Sand Co.
Green, A. P., Fire Brick Co.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Potters Supply Co.
Taylor, Charles, Sons Co.
United Clay Mines Corp.



THIS new bulletin is your guide to equipment that will help you speed up or improve production . . . reduce breakage . . . cut costs . . . or overcome problems in movement-control or materials-handling. Denison has specialized for many years in adapting the unique advantages of oil hydraulics to ceramic production. Today, leading firms in every branch of the ceramic field use Denison HydrOILic equipment—for extruding, drying, hauling, burning, pressing and other operations. You'll find higher efficiency with HydrOILics in your own plant.

Your free copy of Bulletin CB-1 will be sent to you promptly on your letterhead request. Write today, or get in touch with your Denison representative. The Denison Engineering Company, 1161 Dublin Road, Columbus, Ohio.

- PUSHERS (CAR PROPELLERS)
- PUMPS AND POWER UNITS
- KILN CAR ELEVATORS
- 2 to 100 TON PRESSES
- CLAY EXTRUSION CYLINDERS
- OTHER HYDRAULIC EQUIPMENT

DENISON EQUIPMENT in APPLIED HydrOILics
TRADE-MARK

Clay (German Vallendar)
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemical Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Kentucky Clay Mining Co.
Porcelain Enamel and Mfg. Co
The Vitro Mfg. Co.

Clay (Micronized)
Porcelain Enamel and Mfg. Co.

Clay Miners
American Colloid Co.
Great Lakes Foundry Sand Co.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay (Potters)
Hammill & Gillespie, Inc.
The Hommel, O., Co., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay (Process Equipment)
Lancaster Iron Works, Inc.
National Engineering Co.

Clay (Sagger)
Georgia Kaolin Co.
Great Lakes Foundry Sand Co.
The Hommel, O., Co., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Potters Supply Co.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay-Slip (Albany)
Ceramic Color & Chemical Mfg. Co.
Hammill & Gillespie, Inc.
United Clay Mines Corp.

Clay (Wad)
Kentucky Clay Mining Co.
Potters Supply Co.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Clay (Wall Tile)
Hammill & Gillespie, Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Spinks, H. C., Clay Co.
United Clay Mines Corp.

Cleaners
Pennsylvania Salt Mfg. Co.
Porcelain Enamel and Mfg. Co.

Cleaners, Chemical
Harshaw Chemical Co.
Pennsylvania Salt Mfg. Co.

Clocks (Gauge Board)
The Hommel, O., Co., Inc.

CO_2 Recorders
Hays Corp.

Cobalt Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Cobalt Sulphate
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Colors
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Combustion Control
Hays Corp.

Combustion Meters (CO_2 Recorders)
Hays Corp.

Cone Plaques
Industrial Ceramic Products, Inc.

Cones
The Edward Orton, Jr., Ceramic Foundation

Control—Oil-Air Ratio
Hays Corp.

Controllers—Gas-Air Ratio
Hays Corp.

Controllers—Automatic Tank Pressure
Hays Corp.

Conveying Equipment
Frazier-Simplex, Inc.
Lancaster Iron Works, Inc.
National Engineering Co.

Copper Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Corhart
Corhart Refractories Co.

Cornwall Stone (Imported)
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Eureka Flint & Spar Co.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.

Crucibles (Filter, Melting, Ignition)
Carborundum Co.
Norton Co.
Potters Supply Co.
Taylor, Charles, Sons Co.

Crushers (Clay)
Lancaster Iron Works, Inc.

Cryolite (see Kryolith)
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Pennsylvania Salt Mfg. Co.
The Vitro Mfg. Co.

Crystolon (Refractory Products)
Norton Co.

Cullet, Washing Plants, Incinerators, Crushers
Frazier-Simplex, Inc.

Cutters (Bar)
Industrial Ceramic Products, Inc.

Cutters: Diamond impregnated wheel type
Felker Mfg. Co.

Decorating Supplies
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Disintegrators
Lancaster Iron Works, Inc.
National Engineering Co.

Draft Gauges, Recording-Indicating
Hays Corp.

Dryer (Pipe Rack)
Lancaster Iron Works, Inc.

Dryers (Tunnel, Batch)
Harrop Ceramic Service Company

Drying Machinery
Frazier-Simplex, Inc.
Lancaster Iron Works, Inc.
Proctor & Schwartz, Inc.

Electrocast Refractories
Corhart Refractories Co.

Enamelers' Borax
Ceramic Color & Chemical Mfg. Co.
Porcelain Enamel and Mfg. Co.

Enameling Equipment (Complete)
Ceramic Color & Chemical Mfg. Co.
Frazier-Simplex, Inc.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
The Vitro Mfg. Co.

Enameling Furnaces
Carborundum Co.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Lancaster Iron Works, Inc.
Norton Co.

Enameling Iron (Sheet)
American Rolling Mill Co.

Enameling Muffles
Carborundum Co. (*Carbofrax*)
Frazier-Simplex, Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Norton Co. (*Alundum*)

Enameling (Practical Service)
Ceramic Color & Chemical Mfg. Co.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Ind., Inc.
Metal & Thermit Corp.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Enamels
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Enamel Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.

Enamels (Porcelain)
Ceramic Color & Chemical Mfg. Co.
The Hommel, O., Co., inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Equipment (Porcelain Enameling)
Ceramic Color & Chemical Mfg. Co.
The Hommel, O., Co , Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.

Feldspar
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Eureka Flint & Spar Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Filter Fabrics
Metakloth Company

Fire Brick
Carborundum Co.
Corhart Refractories Co.
Electro Refractories & Alloys Corp
Green, A. P., Fire Brick Co.
Norton Co.
Taylor, Charles, Sons Co.

Fire Brick—Process Equipment
Lancaster Iron Works, Inc.

Fire Clay
Great Lakes Foundry Sand Co.
Spinks, H. C., Clay Co
Taylor, Charles, Sons Co.

Flint
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Great Lakes Foundry Sand Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Porcelain Enamel and Mfg. Co.

Flint Pebbles
Ceramic Color & Chemical Mfg. Co.
Eureka Flint & Spar Co.
The Hommel, O., Co., Inc
Ingram-Richardson Mfg. Co. of Indiana, Inc.
The Vitro Mfg. Co.

Floors (Non-Slip)
Norton Co.

Fluorspar
Ceramic Color & Chemical Mfg. Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

French Flint
Eureka Flint & Spar Co.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.

Frit
Ceramic Color & Chemical Mfg. Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Frosting Mixtures
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Fuel Oil Systems and Control. Stokers
Frazier-Simplex, Inc.

Furnaces
Carborundum Co. (*Carboradiant*)
Frazier-Simplex, Inc.
The Hommel, O., Co., Inc.
Ingram-Richardson Mfg. Co. of Indiana, Inc.
Swindell-Dressler Corp.

Furnaces, Enameling
Swindell-Dressler Corp.

Gauges, Draft (Recording, Indicating)
Hays Corp.

Gauges, Pressure
Hays Corp.

Gauges, Flow (Air and Gas)
Hays Corp.

Gauges, Ratio (Flows)
Hays Corp.

Glass Bending Ovens, Glass Decorating Machines
Frazier-Simplex, Inc.

Glass Equipment
Lancaster Iron Works, Inc.

Glass Melting Tanks and Furnaces
Frazier-Simplex, Inc.

Glass Sand
Great Lakes Foundry Sand Co.

Glass Thickness Gauge
Bausch & Lomb Optical Co.

Glaze and Body Spar
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Eureka Flint & Spar Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Glazes and Enamels
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.

Greetings
to
Members and Visitors at the
Meeting of the
American Ceramic Society

VISIT WITH

Mr. V. J. Roehm

and

Mr. W. J. Watkins

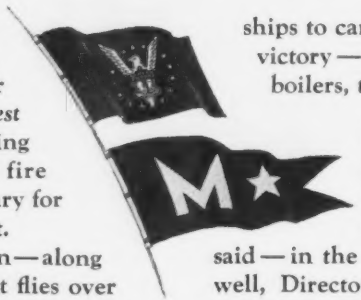
Hotel William Penn

KENTUCKY CLAY MINING COMPANY
MAYFIELD, KENTUCKY

TAKING THEIR PLACE

beside those who "Praise the Lord— and Pass the Ammunition"

UPON the work clothes of every A. P. Green employee is worn the U. S. Maritime Commission's Labor Merit Badge—*the Commission's highest award* — in recognition of outstanding achievement in the production of fire brick and refractory materials necessary for lining the boilers of the Victory Fleet.



This Award of Merit in production—along with the Maritime "M" pennant that flies over the A. P. Green Fire Brick plant — has been accepted with pride and is worn with the realization that it carries a great obligation. Without ships to carry needed supplies there can be no victory — and without fire brick to line the boilers, these ships can not sail the seas.

Every day—twenty-four hours a day, A. P. Green workers are turning out fire brick and refractories to help give America the materials needed for victory. Truly it can be said — in the words of Colonel Willard F. Rockwell, Director of Production for the Maritime Commission, "These A. P. Green men — and women, too — are taking their place beside those who praise the Lord and pass the ammunition."

the First Name in Refractories

Fireclay Brick . . . Super Duty Brick . . . High Alumina Brick . . . Special Refractory Tile Insulating Fire Brick . . . Plastic Fire Brick . . . Mortars . . . Maintenance Coating Materials Refractory Castables . . . Oil Burner Combustion Chambers . . . Industrial Insulations

A. P. GREEN FIRE BRICK CO.
MEXICO, MISSOURI
Offices: NEW YORK • CHICAGO • DETROIT • ST. LOUIS • TORONTO

A. P. GREEN
FIRE BRICK COMPANY
MEXICO, MISSOURI

What did he SEE in his crystals?

DR. A. E. FOOTE, who conceived this company in 1876, was born too soon to read the future in the crystals and minerals he loved. His idea was simply to supply collections of minerals to universities, museums and scientific groups for furthering the study of mineralogy and geology. He could not foresee . . . then . . . ships nosing into Philadelphia for Foote, bearing tungsten-tin ore from Bolivia, rutile from Brazil, manganese from Cuba, and rare or needed minerals from the four corners of the world. He could not predict Foote engineers circling the globe in search of new mineral deposits, or working side-by-side with scientists in industry to probe the possibilities of strontium, lithium, zirconium and scores of other metals and their compounds. He could not foretell with his "specimens" that Foote would help weld the ships for the African second front, or riddle Jap Zeros with tracer bullets, or help speed Jack Benny or the latest communiqué from Moscow over the nation's networks. Dr. Foote might well have wondered how the beautiful stones of his collections would benefit the refining, chemical, ceramic, metal, electronics and many another industry. But it is for you and for us now to wonder and ponder the next move. We are ready to help you with chemicals, ores, metals and alloys and with a valuable accumulation of experience and research. Write today.

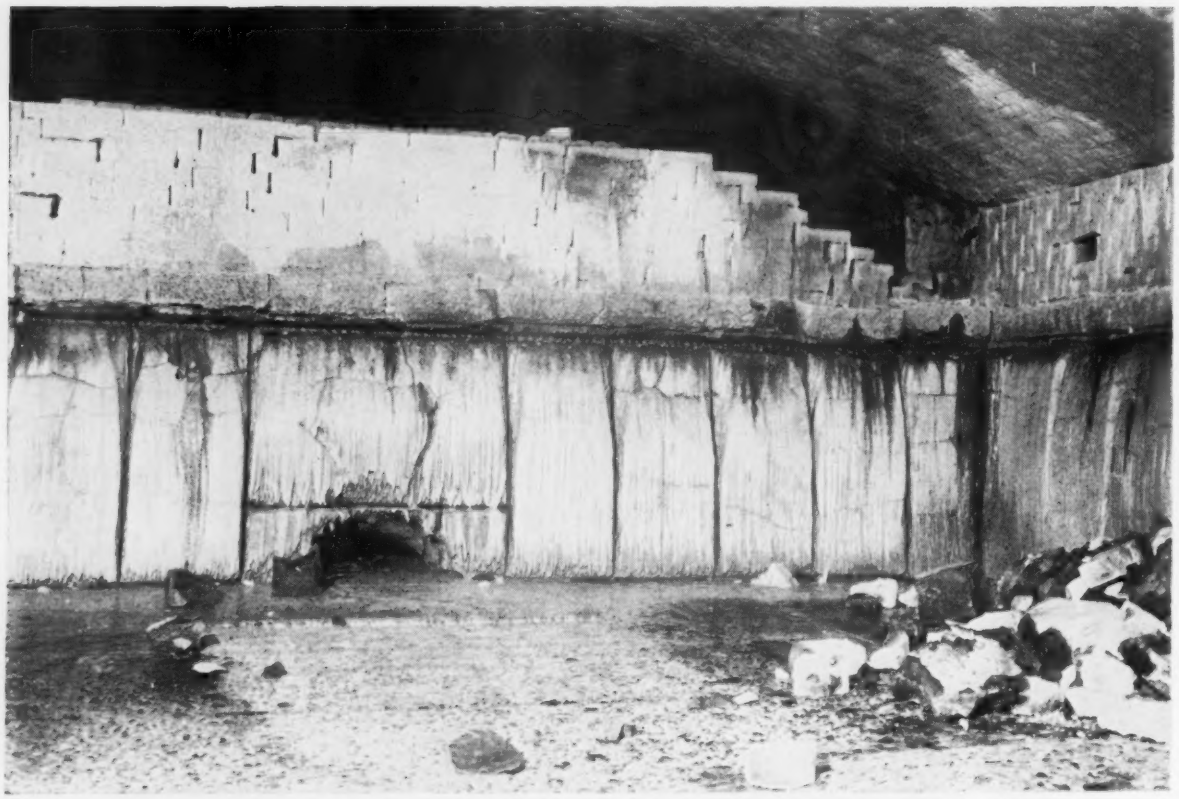
LOOK INTO STRONTIUM NOW!

For those of you who are not content to "sit tight" and "let well enough alone," strontium salts open an almost unexplored field in ceramics—with boundless possibilities. The Foote Mineral Company in its own laboratories, and in a great midwestern university, is conducting researches for determining the value of strontium in ceramic glazes. Evidence is piling up on the importance of strontium as a replacement for barium and lead in glazes for enamelware, whiteware, tile and dinnerware. Aside from other notable product and production benefits which are now virtually assured, strontium is, of course, non-poisonous, a powerful advantage over lead and barium in the manufacture of dinnerware glaze work. For a more complete report of current research and developments of strontium in ceramics, kindly write us.

Foote
MINERAL COMPANY

A Step Ahead in Industrial Ores and Chemicals

PHILADELPHIA • ASBESTOS • EXTON, PENNSYLVANIA
Home Office: 1614 SUMMER STREET, PHILADELPHIA, PA.
West Coast Representative: GRIFFIN CHEMICAL CO., San Francisco, California



Electrocast Blocks Still Good After 984 Days!

HERE is a performance story for a Corhart* Electrocast balanced unit—a story that is not only good but typical.

The life and production figures provoke and merit interest. Here they are—compare the last item with your own statistics.

	Fire 1940—1942
TOTAL DAYS LIFE	984 days
OPERATING DAYS	964 days
IDLE DAYS	20 days
TOTAL TONS GLASS PRODUCED	82,582
TONS GLASS PRODUCED PER OPERATING DAY	85.66
SQUARE FEET OF MELTING AREA PER TON GLASS PER OPERATING DAY	5.88
TONS OF GLASS PER SQUARE FOOT MELTING AREA PER LIFE	163.73

The glass melted throughout the campaign was a standard clear flint bottle glass.

The furnace did not fail, but was shut down at the proper seasonal point for most advantageous repairing.

Or, as our customer himself wrote us, ". . . when we were able to get into this furnace we found that the Corhart blocks were all in very good condition and we believe that we could have gotten at least six more months from this furnace which would have made the furnace run for over three years. This is what we are aiming for when we place the furnace into production again. . . ."

That's the story—a long successful life summarized in a few words.

Corhart Refractories Co., Incorporated, 16th and Lee Streets, Louisville, Kentucky.

*Not a product, but a registered trade-mark.

QUALITY ECONOMY ENDURANCE

CORHART ELECTROCAST REFRACTORIES

THE BULLETIN SECTION

Volume 22 **April 15, 1943** **Number 4**

WAR CONGRESS GENERAL SESSION

Hotel William Penn: Ball Room

Monday Forenoon, April 19, 1943: 9:30 A.M.–12:00 M.

Presiding Chairman: Louis J. Trostel, President of The American Ceramic Society, Inc.

9:30–10:00 A.M.

1. Business Session

10:00–10:15 A.M.

2. President's Address

BY LOUIS J. TROSTEL: General Refractories Company, Baltimore, Md.

10:15–11:15 A.M.

3. War Council of Structural Clay Products Institute

BY DOUGLAS WHITLOCK: Structural Clay Products Institute, Washington, D. C.

11:15A.M.–12:00 M.

4. Plant Hygiene

BY DR. FRANCIS R. HOLDEN: Industrial Hygiene Foundation of America, 4400 Fifth Avenue, Pittsburgh, Pa.

WAR CONGRESS GENERAL SESSION (concluded)

Ball Room

Monday Afternoon, April 19, 1943: 2:00 P.M.–4:30 P.M.

Chairman: Louis J. Trostel, General Refractories Company, Baltimore, Md.

2:00–3:00 P.M.

5. Address

BY CHANCELLOR JOHN G. BOWMAN: University of Pittsburgh, Pittsburgh, Pa.

3:00–4:00 P.M.

6. American Industry in the War

BY AMORY HOUGHTON: Corning Glass Works, Corning, N. Y.

4:00–5:00 P.M.

7. National Roster and the Engineer

BY KIRK MILES: National Roster of Scientific and Specialized Personnel, Tenth and U Sts., N. W., Washington, D. C.

Edward Orton, Jr., Fellow Lecture

"Petrology and Silicate Technology"

Speaker: Norman L. Bowen, Department of Geology, University of Chicago

Urban Room

Monday Evening, April 19, 1943: 8:30P.M.

PETROLOGY is concerned with the rocks and mineral deposits of the earth's crust. Like all natural sciences, it developed through a descriptive stage in which the principal emphasis was on the collection and correlation of facts. Recently interpretation has been increasingly stressed, and it has been realized that to reach reliable conclusions regarding the origin of earth materials experiment is an indispensable aid.

ACTING on this conviction, the petrologist has studied the behavior of various earth materials subjected in the laboratory to a wide range of temperatures, pressures, and chemical environment. He has thus been enabled to reach certain conclusions regarding the conditions to which these materials were subjected during the natural processes by which they were formed. Inevitably he discovered a great many facts of service to the mineral technologist.

SOME of the industrial processes developed by the mineral technologist have, in return, served to supplement the petrologist's laboratory experiments. Some aspects of this mutual service of mineral technology and petrology will be discussed.

GENERAL ENTERTAINMENT PROGRAM

E. E. Marbaker, *General Chairman*
Ernest M. Hommel, *Entertainment Chairman*

Sunday Night, April 18: 8:30 P.M.
Ball Room

Address, "Glass after the War" by Alexander Silverman, University of Pittsburgh
Reception, Music, Refreshments

Monday Night, April 19: 8:30 P.M.
Urban Room

Edward Orton, Jr., Fellow Lecture: "Petrology and Silicate Technology" by Norman L. Bowen, University of Chicago

Ball Room

Informal Dance and Light Supper

Tuesday Night, April 20: 8:30 P.M.–11:00 P.M.
Ball Room

Evening of Magic presented by Paul Fleming
Entr'acte, Mellon Institute Glee Club

LADIES' ENTERTAINMENT

Mrs. W. Keith McAfee, Chairman

Sunday Night, April 18: 8:30 P.M.

"Glass after the War" by Alexander Silverman, University of Pittsburgh
Reception, Music, Refreshments

Monday Afternoon, April 19

Trip to the Planetarium
Bridge Luncheon at Boggs & Buhl Store

Monday Night, April 19: 8:30 P.M.

Edward Orton, Jr., Fellow Lecture: "Petrology and Silicate Technology" by Norman L. Bowen, University of Chicago
Informal Dance and Light Supper

Tuesday Forenoon, April 20: 10:00 A.M.

Exhibits at University of Pittsburgh and Carnegie Museum

Tuesday Afternoon, April 20: 1:00 P.M.

Luncheon and Bridge at University Club

Tuesday Night, April 20: 8:30 P.M.–11:00 P.M.

Evening of Magic presented by Paul Fleming
Entr'acte, Mellon Institute Glee Club

Wednesday Afternoon, April 20

Fashion Show and Tea at Kaufmann's Department Store

Meeting Room Assignments

Board of Trustees—Sunday—9:30 A.M., Luncheon, Urban Room
Fellows—Sunday—2:30 P.M.–8:00 P.M., Dinner, Cardinal Room
Keramos—Tuesday—4:30 P.M., Room 735
Institute of Ceramic Engineers—Wednesday—4:30 P.M., Urban Room
Ceramic Educational Council—Sunday—12:00 M.–2:30 P.M., Urban Room
Ceramic Camera Club Exhibit—All four days, Parlors E and F
Alumni Dinners—Tuesday—6:00 P.M.
Art Division—Forum Room
Enamel Division—Parlors B and C
Glass Division—Cardinal Room
Materials and Equipment Division—Adonis Room
Refractories Division—Urban Room
Structural Clay Products Division—Silver Room
White Wares—Ball Room
Press—Parlor G

LOCAL COMMITTEE PERSONNEL

Honorary Chairman, E. Ward Tillotson, Mellon Institute
General Chairman, Edward E. Marbaker, Mellon Institute
Vice General Chairman, A. Paul Thompson, Mellon Institute

Executive Committee

Chairman, H. E. Simpson, Mellon Institute
F. C. Flint, Hazel-Atlas Glass Co., Washington, Pa.
W. Keith McAfee, Universal Sanitary Mfg. Co., New Castle, Pa.
R. N. Palmer, Mellon Institute
John W. Jordan, Mellon Institute

Entertainment Committee

Chairman, Ernest M. Hommel, O. Hommel Co., Pittsburgh, Pa.

Ladies' Entertainment

Chairman, Mrs. W. Keith McAfee
Mrs. Joseph F. Keaney
Mrs. F. C. Flint
Mrs. Ernest Hommel
Mrs. Edward W. Marbaker
Mrs. E. Ward Tillotson
Mrs. H. E. White

Service Committee

Chairman, R. M. Campbell, New York State College of Ceramics, Alfred, N. Y.
J. W. Jordan, Mellon Institute
O. J. Whittemore, Jr., Mellon Institute

Ceramic Camera Club

Victor H. Remington, B. F. Drakenfeld and Company, Inc., Washington, Pa.

Art Activities

C. Fred Sauereisen, Sauereisen Cements Co., Sharpsburg, Pa.

CERAMIC CAMERA CLUB SALON OF PHOTOGRAPHY

All Week: Parlors E and F

Board of Control

H. M. Kraner, *President*, Bethlehem, Pa.
J. Earl Frazier, Washington, Pa.
Rolland Roup, Milwaukee, Wis.
R. W. Knauft, Cincinnati, Ohio
Victor H. Remington, *Secretary-Treasurer*, Washington, Pa.

Jury of Selection

F. Ross Altwater, 9 Wood St., Pittsburgh, Pa.
W. O. Breckon, Forbes Building, Pittsburgh, Pa
Charles E. Irwin, Edgeworth, Sewickley, Pa.

Frazier Award

Members of the Jury of Selection will also select the outstanding print for the Frazier Award.

Annual Dinner and Announcement of Prizes—Monday Evening, April 19, 6:30.

ART DIVISION PROGRAM

Chairman: J. A. Foster, 9591 Sorrento Ave., Detroit, Mich.
Secretary: Marion L. Fosdick, New York State College of Ceramics, Alfred, N. Y.

Program Committee
H. S. Nash, Chairman: School of Applied Arts, University of Cincinnati, Cincinnati, Ohio

Hotel William Penn: Forum Room

Tuesday Forenoon, April 20, 1943: 9:30 A.M.–12:00 M.

1. American Utility Ware

By Eva Zeisel (Mrs.): Pratt Institute, Brooklyn, N. Y.

The work in the ceramic design classes of Pratt Institute on American utility ware is described.

2. Student Work in Department of Industrial Design at New York State College of Ceramics

By Charles Harder: New York State College of Ceramics, Alfred, N. Y.

A discussion is presented of the program of the Industrial Design Department with an explanation of its methods of instruction (Illustrated with slides of student work.)

3. Designing for Tomorrow

By Peter Muller-Munk: Carnegie Institute of Technology, Pittsburgh, Pa.

The United States is in the middle of an almost incredible expansion of its productive facilities. The problem of today is whether we can turn out enough on time. Tomorrow's problem, once the peace is won, will be the utilization of the resources developed today. American industry must plan ahead so that it will not be caught short by the problems of sudden peace. Intelligent and farsighted design planning offers a solution to this question. The speaker, who is retained by some of America's outstanding manufacturers for postwar product development, will outline the ways and means of tomorrow's design trend.

4. Utilitarian Design of Ceramic Products

By Rexford Newcomb: Ceramic Consultant, Conservation and Substitution Branch, Conservation Division, War Production Board, 1100 H Street, N. W., Washington, D. C.

A number of newly developed ceramic products designed chiefly for civilian use are described, with emphasis on functional design. The properties of ceramic articles which make them suitable as substitutes for more critical materials are stressed. Reference is made to the wide utilization of ceramics in the countries of Europe.

5. Fashion in Dinnerware

By Philip Distillator: Vogue Mercantile Company, 1140 Broadway, New York, N. Y.

The topics for discussion will be (1) subjects relating to merchandising of dinnerware in retail outlets from the standpoint of fashion; (2) how a successful public expression of opinion relating to pattern can be obtained; and (3) the present fashion trend and its development.

ART DIVISION PROGRAM (continued)

Forum Room

Tuesday Afternoon, April 20, 1943: 2:00 P.M.–4:30 P.M.

6. Fifty Years of Decorative and Table Glassware

By Marvin G. Yutzey: Fostoria Glass Company, Moundsville, W. Va.

A review is given of successful style trends in the past fifty years as experienced by a leading decorative and table glassware manufacturer. The probable reasons for the success of each is discussed with illustrations. A designer's viewpoint on postwar planning and a glance into the future are presented.

7. Occupational Therapy

By Helen S. Willard: Philadelphia School of Occupational Therapy, 419 South 19th Street, Philadelphia, Pa.

The modern use of occupational therapy is emphasized as it is administered by the trained technician under medical supervision. The development of the profession, its aims, training required, various phases of application, relationship to the fields of medicine, psychology, sociology, and its place in the present emergency and future rehabilitation are discussed.

8. Ceramic Art in Pennsylvania Schools

By C. Valentine Kirby: Chief, Art Education, Commonwealth of Pennsylvania, Department of Public Instruction, Harrisburg, Pa.

A survey of the ceramic arts as developed over a wide area of Pennsylvania is presented.

9. Founder of the Art Division, Frederick Hurten Rhead

By Paul E. Cox: Abrasive Company, Tacony and Fraley Streets, Philadelphia, Pa.

An appreciative review of the skills and talents of Frederick H. Rhead is presented to members of the Art Division to indicate to them the many experiences artists must gain to be qualified to direct artwork in dinnerware factories.

10. Scientific Research as a Source of Design Suggestion

By Hobart M. Kraner: Bethlehem Steel Company, Bethlehem, Pa.

Pictures are shown of highly magnified sections of various materials, made for scientific reasons but possessing design suggestion and provocation to the designer.

ART DIVISION PROGRAM (continued)

Forum Room

Wednesday Forenoon, April 21, 1943: 9:30 A.M.–12:00 M.

11. Pottery in Relation to Flower Arrangements

By Lillian Norstad (Mrs. Magnus): 80 Madison Avenue, Valhalla, N. Y.

Interest in flower arrangements and containers for them has reached a state of national importance. Some of the elements of shape, color, and texture suited to pottery flower containers are described.

12. The Peasant Potters of Quebec

By Oscar Beriau: Department of Agriculture, Quebec, Canada

A detailed description is given of an unusual government project in the County of Beauce, Province of Quebec. The sons of farmers are established on small farms and given training in agriculture, carpentry, drawing, modeling, and pottery. The boys are farmers in summer and potters in winter. They raise their own food, build their own furniture, and make pottery supply their cash income.

13. Early Ceramic Arts as a Reflection of Chinese Esthetic Ideals (Illustrated)

By Walter R. Hovey: Department of Fine Arts, University of Pittsburgh, Pittsburgh, Pa.

The topics for discussion are (1) forms, (2) pictorial designs, (*a*) painted, (*b*) incised, and (*c*) stamped; and (3) ceramic sculpture, (*a*) interpretations of subjects and (*b*) technique.

14. Use of Earth Colors for the Painter's Palette (Illustrated)

By Kenneth E. Smith and Will Henry Stevens: Newcomb School of Art, New Orleans, La.

Earth colors are an added source of pigment, inexpensive and easily obtainable, for the artist interested in materials and techniques. A successful process for making pastel crayons using ball clay as the bond is given.

15. Drawings and Specifications for a Small Globar Kiln

By Edgar Littlefield: Department of Fine Arts, Ohio State University, Columbus, Ohio

ART DIVISION PROGRAM (concluded)

Forum Room

Wednesday Afternoon, April 21, 1943: 2:00 P.M.–4:30 P.M.

16. Low-Fire Clay Body and Glaze for Public School and Occupational Therapy Use

By Harold W. Hunsicker: 1649 Elberon Ave., East Cleveland, Ohio

A clay body and glazes suited to low temperatures and for use in small electric kilns are described. The advantages of such materials for use in schools, community centers, and for occupational therapy work are pointed out. The working temperature is at cones 06 to 05.

17. Development of Some Ovenware and Cookingware Bodies

By Forrest Burnham and Milton Tuttle: New York State College of Ceramics, Alfred, N. Y.

Tests are described which were conducted to develop ceramic bodies with high heat-shock resistance so that cookingware made from these bodies may be used for top-of-stove ware as well as for ovenware.

18. Practical Production of One-Fire Luster Glazed Pottery

By Forrest Burnham and Charles Harder: New York State College of Ceramics, Alfred, N. Y.

A method is described for producing luster glazes in a variety of colors. Minute amounts of metallic colorants are introduced in the glaze batch and reduced on cooling. The controlling factors of composition, concentration, atmosphere, and application are discussed. Samples of typical results are shown.

19. Use of Insulating Brick for Ceramic Sculpture

By J. Sheldon Carey: Rhode Island School of Design, Providence, R. I.

An experimental development of the possibilities of insulating brick as a medium for ceramic sculpture is described. Various methods or techniques of cutting the material and a variety of surface treatments with slip and glaze are outlined.

20. Peculiar Contribution of Ceramics to Childhood Education

By Martha M. Sherman: Groesbeck, Ohio

With clay as a medium of expression, a primary class developed desirable creative attitudes in learning. Clay is peculiarly well suited to the job. Mastery of skill is necessary only insofar as it helps support the development of individual capacity to see, feel, and think.

21. Ceramic Sculpture for the Interior Decorator

By Bernard Frazier: Design Department, University of Kansas, Lawrence, Kansas

ENAMEL DIVISION PROGRAM

Chairman: Karl Kautz, Climax Molybdenum Company, Canton, Ohio
Secretary: D. G. Moore, National Bureau of Standards, Washington, D. C.

Program Committee
D. G. Bennett, Chairman, Mellon Institute, Pittsburgh, Pa.

Hotel William Penn: Parlors B and C

Tuesday Forenoon, April 20, 1943: 9:30 A.M.–12:00 M.

1. Relation of Thickness to Impact Resistance of Porcelain Enamel

By Roger L. Fellows: Chicago Vitreous Enamel Product Company, Cicero, Ill.

Chipping of porcelain enamel on the flanges of table tops due to impact was studied and compared with the results obtained using the P. E. I. Tentative Standard Impact Test. It was found that there was a correlation between the results using the P. E. I. test on standard 1-in. tubes and those obtained on the corner of a table-top flange. It was also noted that the impact resistance of enamels applied over a radius increases as the thickness of the enamel increases.

2. Use of Zirconium Opacifiers in Enamels

By E. W. Miller and J. F. McMahon: New York State College of Ceramics, Alfred, N. Y.

The opacifying effects of different zirconium compounds when used as mill additions to enamel frits were studied. In some cases, zirconium compounds which were good opacifiers in one enamel proved to be poor opacifiers in other enamels.

3. History and Development of Cutting, Honing, and Grinding Fluids

By D. J. Benoliel: Quaker Chemical Products Company, Conshocken, Pa.

4. Relation of Hydrogen to Adherence of Sheet-Steel Enamels

By W. A. Deringer: A. O. Smith Corporation, Milwaukee, Wis.

The principal theories of adherence are reviewed, and a new theory involving hydrogen gas is discussed. A review of the literature and the experimental data show that hydrogen is a factor in the adherence of sheet-steel enamels and that adherence, reboiling, and fish-scaling are closely related.

5. Mechanics of Enamel Adherence, XV: Influence of Cobalt and Nickel Oxides and Their Mixtures on Metal Precipitation at the Ground Coat-Iron Interface

By R. M. King: Department of Ceramic Engineering, Ohio State University, Columbus, Ohio

A previous paper has described studies on the influence of varied amounts of cobalt oxide on the precipitation of metal at the ground coat-iron interface by measuring the electrical resistance of the ground coat as it was heated and cooled between two iron surfaces. In work described in this paper, the same method, with some refinements, was used to determine the single and mutual effects of cobalt and nickel oxides.

ENAMEL DIVISION PROGRAM (continued)

Parlors B and C

Tuesday Afternoon, April 20, 1943: 2:00 P.M.–4:00 P.M.

Symposium on "The Duration Program for the Enamel Industry and Postwar Considerations"

Speakers

6. A. I. Andrews: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.
7. J. J. Canfield: American Rolling Mill Company, Middletown, Ohio
8. G. H. McIntyre: Ferro Enamel Corporation, Cleveland, Ohio
9. B. T. Sweely, Chicago Vitreous Enamel Product Company, Cicero, Ill.
10. C. S. Pearce, Porcelain Enamel Institute, 1010 Vermont Avenue, N. W., Washington, D. C.

ENAMEL DIVISION PROGRAM (concluded)

Symposium on "Testing and Classification of Ball Clays"

Members of the Enamel Division are meeting in joint session with the White Wares Division and the Materials and Equipment Division for this Symposium.

Ball Room

Wednesday Forenoon, April 21, 1943: 9:30 A.M.–12:00 M.

For program outline of this Symposium, see p. 106.

Enamel Division Luncheon and Business Meeting

Adonis Room

Wednesday Noon, April 21, 1943: 12:30 P.M.–2:00 P.M.

Members of the Enamel Division will be meeting with the White Wares and Materials and Equipment Divisions for the Ball Clay Symposium.

For the luncheon on Wednesday noon, they will move to the Adonis Room.

Following the luncheon, the members will again join in the White Wares Division Program being held in the Ball Room.

Additional Title

11. Enameled Utensil Manufacturers' Council Tentative Standard Solubility Test for Porcelain Enameled Cooking Utensils

By F. A. Petersen and A. I. Andrews: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

A description is given of the equipment and method for testing porcelain enameled kitchen utensils for resistance to acid solubility. The factors which influence the test results and a comparison of errors encountered in this and other methods of determining solubility of porcelain enamels are discussed.

GLASS DIVISION PROGRAM

Chairman: W. C. Taylor, Corning Glass Works, Corning, N. Y.
Secretary: S. R. Scholes, New York State College of Ceramics, Alfred, N. Y.

Program Committee
J. F. Greene, Chairman: Kimble Glass Company, Vineland, N. J.

Hotel William Penn: Cardinal Room

Tuesday Forenoon, April 20, 1943: 9:30 A.M.–12:00 M.

1. Arkansas Glass Materials

By Richard J. Anderson: Acting State Geologist, State Capitol, Little Rock, Ark.

2. Method for Estimating Expansibility of Glass at High Temperatures

By S. R. Scholes and Kurt Mooney: New York State College of Ceramics, Alfred, N. Y.

Molten glass fills to overflowing a measured cavity in a refractory block; on cooling, it leaves a depression whose volume can be measured. After correction for the volume change of the refractory, the cubical expansion of the glass is estimated.

3. Factors Affecting the Degree of Homogeneity of Glass

By Fay V. Tooley and R. L. Tiede: Research Laboratories, Owens-Corning Fiberglas Corporation, Newark, Ohio

Methods of glass preparation vary considerably and the degree of homogeneity achieved is a reflection of the complete past history of preparation of the glass. The present study relates to the homogenizing rate of glass under controlled conditions.

4. Optical Fluor-Crown Glasses

By W. A. Fraser and L. O. Lipton: Bausch & Lomb Optical Company, Rochester, N. Y.

The effect of variation of composition on optical properties was studied. The compositions were restricted as far as possible to low molecular weight oxides, such as silica, fluorine, boric acid, alumina, and alkalies. The index of refraction is lowered by substitutions of fluorine and alumina for silica; the reciprocal dispersion, however, is increased by fluorine and lowered by alumina so that fluorine and alumina can be balanced against each other to give almost any desired optical properties within the limited field in this investigation.

5. Surface Layer of Sheet Glass

By F. L. Bishop, Jr.: American Window Glass Company, Pittsburgh, Pa.

This research is an attempt to obtain some evidence of the nature of the fire polish on sheet glass. In 1886, Lord Rayleigh found deviations from Fresnel's laws of reflection from a dielectric. Maclaurin, in 1907, set forth equations to explain these deviations on the basis of a surface layer for which the thickness could be found providing the dielectric constant is assumed to be known. The results of this research were based on three measurements on each sample. The first of these was a careful measurement of the deviations from Fresnel's reflection laws. Plane polarized light with its plane of polarization 45° from the plane of incidence was reflected at Brewster's angle from the glass. According to Fresnel's equations, this light should be reflected as plane-polarized light with its plane of polarization parallel to the glass surface. Because of the surface layer, however, it was slightly ellipitcally polarized. A photographic polarimeter of special design was used for these measurements. A second measurement was based on A. H. Pfund's method of determining the apparent Brewsterian angle as compared to that calculated from the index of refraction of the glass. The third measurement was of the true index of refraction by a prism method in which the samples were cut and ground to 60° prisms.

These measurements showed that freshly drawn sheet glass probably has a crystalline layer several molecules thick on the surface. This layer is of high index but is counteracted quickly by water absorption if the glass is dampened slightly or exposed to the atmosphere.

6. Changes of Properties of a Glass Resulting from Changes of Composition

By Maurice L. Huggins and Kuan-Han Sun: Research Laboratories, Eastman Kodak Company, Rochester, N. Y.

Equations are given for the calculation of changes in density, refractive index, and other optical constants produced by the addition to a base glass having known composition or properties of a known relative weight of a given component or by the substitution of one component for another. Values are computed and listed for the initial fractional rate of change of refractive index (n_D), when various components are added to (*a*) pure SiO_2, and (*b*) a sodium silicate containing 50% by weight of Na_2O.

7. Glass Properties and the Periodic Table

By Maurice L. Huggins and Kuan-Han Sun: Research Laboratories, Eastman Kodak Company, Rochester, N. Y.

In previous papers, the authors have deduced and tabulated values of certain constants, characteristic of the component oxides in silicate glasses, which may be used to compute the density and optical properties of these glasses. Graphs are presented in this paper, showing the dependence of these constants on the atomic number of the element (other than oxygen) in the component. The curves obtained enable an estimate, by interpolation and extrapolation, of the values for components for which experimental data are not at present available.

GLASS DIVISION PROGRAM (continued)

Cardinal Room

Tuesday Afternoon, April 20, 1943: 2:00 P.M.–4:30 P.M.

8. The Vitreous State

By Maurice L. Huggins and Kuan-Han Sun: Research Laboratories, Eastman Kodak Company, Rochester, N. Y.; and Alexander Silverman: Department of Chemistry, University of Pittsburgh, Pittsburgh, Pa.

The difficulty of defining the vitreous state in a rigorous manner, the existence of many borderline cases, and the theoretical requirements which must be met if a substance is to be vitreous are discussed. Certain typical classes of vitreous substances are treated in some detail, with especial regard to relationships between their structures and vitreous properties.

9. Structural Heterogeneity in Glass

By Aniuta Winter (Mrs.): Institute of Optics, Paris, France (now with Research Enterprises, Limited, Leaside, Ontario, Canada)

Study of the mechanical strains present in a sample of glass does not enable prediction of the future behavior of this glass. There is no simple relation between such strains and the physicochemical state of the glass. In fact, it seems probable that most of these states may be obtained with or without birefringence, depending on the thermal treatment to which the glass was submitted. If the glass is not in the equilibrium condition for the temperature at which it is being used, it will transform spontaneously toward that equilibrium. The birth and evolution of strains depend on these physicochemical unbalances as well as on other characteristics of the glass. Only the study of the physicochemical state can give reliable indications of the behavior of glass in practical use.

10. Transformation Region of Glass

By Aniuta Winter (Mrs.):

Evidence for the existence of a "transformation region" rather than a "transformation point" in the 10^{14} poise range of glasses has been produced by a variety of experiments, both static and dynamic. Refractive index was measured (1) on small specimens quenched in air and (2) directly in the furnace by the single-prism and three-prism methods. Quantitative agreement was obtained, and the method of quenched samples is recommended as the simplest of those tested. Thermal expansion coefficients were also determined on the quenched samples.

Disannealing lowered the refractive index of glasses; for a borosilicate crown, by an order of 0.006. The change resulting from strains was comparatively small and in the opposite direction so the birefringence was found to be an untrustworthy indicator of the state of a glass. For a series of optical glasses, the difference between the refractive-index extremes is a function of the lowest temperature at which the minimum index can be realized. Thermal expansion coefficients may also vary with heat-treatment. Two limiting states of glass are postulated to explain the observations. In between these states lies the region of transformation, including an intermediate state for each temperature between the two limiting temperatures. For all of the glasses examined, the extent of the transformation region was about 100°C. The rate of transformation into the low-temperature state may be studied from "equilibrium curves" by plotting stable refractive index as a function of temperature. Whereas the conversion to the high-temperature state is instantaneous at the upper temperature of the transformation region, the conversion to the low-temperature condition demands a minimum time at each temperature, which explains why annealing is such a time-consuming process. The annealing time, however, may be drastically reduced by following the equilibrium curves in a stepwise fashion. With insufficient annealing, higher temperature states are frozen in and transformation continues even at room temperature, as proved by measurements extending over sixteen months of study.

11. Molecular Strains and the Extraordinary Thermal Effects in Glasses

By Arthur Q. Tool: National Bureau of Standards, Washington, D. C.

From measurements made on the delayed or extraordinary volume contractions and expansions in annealing and in "disannealing" glasses, respectively, and also on the accompanying extraordinary heat evolution and absorption, it seems that the quantities of heat evolved and absorbed have the same order of magnitude as the heat equivalents of the work done by and against the enormous "intrinsic pressure" (cohesive forces) as glasses contract or expand extraordinarily. In view of these results and other measurements and because of the belief that the structures of glass and many other extremely viscous materials resemble extended and very irregular networks, or cellular-like and random arrangements, of very large molecules or molecular chains and structures, an attempt is made to correlate the extraordinary thermal effects observed in viscous materials with the gradual relaxation of molecular strains that presumably are developed with every temperature change in highly viscous liquids.

12. Method for Computing Approximately the Changes Caused in Glass by Annealing

By Arthur Q. Tool: National Bureau of Standards, Washington, D. C.

In annealing glass, it is often necessary to change the annealing schedule. Such changes affect the density and refractivity, and the new schedules may or may not result in an adequate reduction of the strain. A method for computing the effects of any change in annealing schedule will be described. Although the results of the computations are only approximate, they will serve as a guide whenever a change in schedule is undertaken. What is more important, they give an insight into the manner in which changes in density and refractivity develop and strains relax.

13. Aging Thermometers

By Bradford Noyes: Taylor Instrument Companies, Rochester, N. Y., and Nelson W. Taylor: Department of Ceramics, Pennsylvania State College, State College, Pa.

It is shown that in the long-time aging of thermometers at constant temperature the change in readings of a fixed point, such as the ice point, normally follows an exponential law, $y = a(1 - e^{-mt})$. Methods are described for the evaluation of the total expected change, a, and of the relaxation time, $1/m$, and of the half-life period, $H = 0.693/m$. Examples are given, and calculations are made of the expected change remaining after any aging time, t.

It is believed that the exponential law is due primarily to bulb shrinkage under the influence of a single molecular mechanism in the glass. Some examples are presented of anomalous behavior, such as reversals in the direction of change. This phenomenon is shown to be a general one in glass, and an interpretation is given in terms of several molecular processes which operate at one time but with different characteristic rates.

14. Eye-Protective Glasses Go to War

By E. L. Hettinger: Willson Products, Incorporated, Reading, Pa.

The importance of eye-protective glasses in the performance of the war program is discussed. There is urgent need for uniform specifications throughout the various government agencies. The necessity for the right kind of protection for the specific job is also emphasized. The required 200 million tons of steel as well as other critical metals could not be produced and fabricated into weapons of war without the proper eye protection for the workers, whether it be welding glass or clear heat-treated glass to keep out flying particles or chips. Eye-protective glasses are the greatest contribution to the fight for the prevention of blindness.

GLASS DIVISION PROGRAM (continued)

Cardinal Room

Wednesday Forenoon, April 21, 1943: 9:30 A.M.–12:00 M.

15. Devitrification Characteristics of Alkali-Lead Oxide-Dolomite Lime-Silica Glasses

By J. F. White and W. B. Silverman: General Research Laboratory, Owens-Illinois Glass Company, Toledo, Ohio

The devitrification characteristics of the field of compositions which include the commercial lime crystal glasses were investigated. Tridymite was found to crystallize from glasses containing as low as 62% of SiO_2. Tridymite, devitrite, diopside, sodium disilicate, and an unidentified compound were found to be primary phases. Potassium oxide (K_2O), in general, lowers the liquidus temperature when it replaces Na_2O.

16. Viscosity of Recent Container Glass

By H. A. Robinson and C. A. Peterson: Armstrong Cork Company, Lancaster, Pa.

Two viscometers which yield highly reproducible results have been constructed for the measurement of the viscosity of glass throughout the entire temperature range encountered in practice. The apparatus is described in detail. Viscosity temperature data are presented for sixteen current container glasses. The chemical analyses of these glasses are also given. It is shown that the data in all cases fit a Fulcher type equation, $\log \eta = -A + \frac{B}{T - T_0}$.

17. Experimental Studies of Temperature Gradients in Glasses of Various Colors

By H. H. Holscher, R. R. Rough, and J. H. Plummer: General Research Laboratory, Owens-Illinois Glass Company, Toledo, Ohio

A laboratory study was conducted on vertical temperature gradients obtained in a small furnace heated over the glass surface. A surface glass temperature of 2615°F. was held, and the effects of various coloring agents, such as ferrous iron, ferric iron, manganese, and cobalt and chromium oxides, were obtained. These effects are compared with certain commercially colored glasses. The data are important when comparing the maximum melting capacities of commercial furnaces inasmuch as they indicate the over-all heat transmission to the various colored glasses at various depths.

18. Effects of Glass on Neutral Grain Spirits, Gins, and Whiskies Stored in Bottles at Room Temperature for Three Years

By A. Herman and H. L. Shay: Joseph E. Seagram & Sons, Incorporated, Seventh Street Road, Louisville, Ky.

The actual change caused by storing neutral grain spirits, gins, and various whiskies in glass bottles supplied by nine different manufacturers and in Pyrex-brand glass at room temperature for three years was determined. The effects of commercial glass on the pH of neutral grain spirits are greater than on gins, blended whiskies, and whisky, respectively. The pH of these products continues to increase proportionately with the time they are stored in commercial glass bottles. Alcohol and gin stored in Pyrex-brand glass remained constant for one year and increased slightly in pH during the time studied. The pH of blended whiskies and whisky stored in Pyrex-brand glass remained constant.

19. Theoretical Aspects of the Chemical Attack of Glasses by Water

By Aaron K. Lyle: Hartford-Empire Company, Hartford, Conn.

The chemical attack of glasses by water is considered to be a diffusion phenomenon in which the rate of release of soluble matter from the glass is slow compared to its rate of diffusion in the attacking medium. An equation based on the assumed conditions is shown to fit laboratory test data and also to offer some basis for extrapolation of results from accelerated tests to service conditions.

20. Standard Method of Examining and Grading Glass Container Ring Sections

By W. R. Lester: Maryland Glass Corporation, Baltimore, Md.

The ring-section technique has been studied by the Standard Testing Procedure Committee of the Glass Container Association, and a tentative Standard Method of Examining and Grading Glass Container Ring Sections has been proposed. The scope, method, and frequency of sampling, method of examination, and the methods used for ware quality grading and glass quality grading are described.

21. Determination of Density by a Flotation Method

By T. C. Vaughan: Hartford-Empire Company, Hartford, Conn.

A procedure for determining density by a flotation method is described. The composition of a liquid is

adjusted until its density matches that of the sample. The density of the liquid is then determined using an accurately calibrated standard. The method is highly accurate and is particularly adapted to measuring the density of small chips of glass. No special apparatus is required.

Glass Division Luncheon and Business Meeting

Cardinal Room

Wednesday Noon, April 21, 1943: 12:30–2:00 P.M.

Address: A New Proposal for the Glass Industry
By Alexander Silverman: Department of Chemistry, University of Pittsburgh, Pittsburgh, Pa.

GLASS DIVISION PROGRAM (concluded)

Cardinal Room

Wednesday Afternoon, April 21, 1943: 2:00 P.M.–4:30 P.M.

22. Current Problems in the Supply of Fuel Oils and Gas

By Alfred G. White: Chief Economist, Petroleum Economics Division, U. S. Bureau of Mines, Department of Interior, Washington, D. C.

The decline in tanker movements and the shift to new and more costly overland rail and pipe-line routes created a major problem in fuel-oil supply in the East Coast and Middle West districts in 1942. This situation was further aggravated by the sharp decline in Illinois crude production. A substantial increase in the demand for fuel oils, coupled with a large decline in total gasoline demand, caused a shift in refinery operations, in relative yields, and in refining costs. These factors necessitated complicated adjustments in price, curtailment of fuel-oil consumption by rationing and conversions to other fuels, and abnormally heavy withdrawals from storage. The demand for natural gas gained substantially, owing to the growth of war-industry requirements. The increase in the base load of existing pipe lines reduced the capacity to meet peak-load demands during the winter heating season, particularly in the Appalachian district. Shortages of well-drilling materials restricted exploration and retarded the development of new production of oil as well as natural gas.

Prospects for 1943 indicate a rising demand for military and war-plant uses that may absorb a substantial part of the increased deliveries by new pipe lines and may compel a continuance of the restrictions on civilian consumption of fuel oils and natural gas. No further heavy liquidation of fuel-oil stocks can be expected to meet regional shortages. In the event of a long war, serious consideration must be given to a program to increase production and total reserves.

23. Raw Materials

By John R. Hostetter: War Production Board, Washington, D. C.

24. Symposium on "Critical and Substitute Materials"

(A) Fining and Decolorizing

By Woldemar A. Weyl: Department of Ceramics, Pennsylvania State College, State College, Pa.

(B) Antimony

By R. R. Shively: B. F. Drakenfeld & Company Incorporated, Washington, Pa.

By John W. Iliff: Harshaw Chemical Company, Cleveland, Ohio

Discussion led by

W. F. Curtis: Fostoria Glass Company, Moundsville, W. Va.
H. H. Spengler: Mahoning Glass Works, General Electric Company, Niles, Ohio
G. E. Reinker: Glass Technology Laboratories, General Electric Company, Cleveland, Ohio
Rexford Newcomb: Conservation Division, War Production Board, Washington, D. C.

25. American Society for Testing Materials, Committee C-14

MATERIALS AND EQUIPMENT DIVISION PROGRAM

Chairman: J. F. McMahon, New York State College of Ceramics, Alfred, N. Y.
Secretary: J. R. Kauffman, Allied Engineering Company, 29 Highland Drive, Milltown, N. J.

Program Committee
Jack F. Day, Chairman, Donald Hagar Ceramic Materials, Zanesville, Ohio
N. B. Davis, 140 Wellington Street, Ottawa, Ontario, Canada

Hotel William Penn: Ball Room

Tuesday Forenoon, April 20, 1943: 9:00 A.M.–12:00 M.

Symposium on "Occurrence, Properties, and Uses of Domestic Talc"

Joint Chairmen: Jack F. Day
C. M. Lambe, Jr., Department of Ceramic Engineering, University of North Carolina, Raleigh, N. C.

Members of the White Wares Division are meeting in joint session with the Materials and Equipment Division for the papers and discussions listed on this program.

This Symposium is sponsored by the officers and members of the Materials and Equipment and White Wares Divisions. The officers of the Materials and Equipment Division have arranged that part of the program relating to the occurrence, properties, and beneficiation of talcs, and the officers of the White Wares Division have arranged that portion describing the manufacture of products and the properties of the products. Particular emphasis will be placed on the production of steatite porcelain.

1. Physical Testing of Talc for High-Frequency Ceramics

By Sidney Speil: U. S. Bureau of Mines, Electrotechnical Laboratory, Norris, Tenn.

The preparation of test specimens is described as well as methods employed in testing approximately seventy talcs, including materials for commercial use and samples from new sources. Correlations are noted between chemical analysis and the measured physical properties if they are present to any degree.

2. Physical Chemistry of Firing Steatite Bodies

By R. L. Stone: Department of Ceramic Engineering, University of North Carolina, Raleigh, N. C.

3. Possible Use of Ferruginous Talcs in Steatite Dielectrics

By H. G. Ueltz: Rutgers University, New Brunswick, N. J.

Several iron-bearing talcs were fired alone and in body form and were measured for shrinkage and absorption. Their colors were also noted. Electrical measurements of dielectric constant were made on the bodies and compared with white-firing talcs. The effect of small additions of Fe_2O_3 on a white-firing talc is also described.

4. A Study of the Talc Minerals in Steatite Bodies

By John W. Lennon and A. S. Watts: Department of Ceramic Engineering, Ohio State University, Columbus, Ohio

A study was made of thirty talcs alone and in a steatite body in which the Al_2O_3 is derived from a clinochlore vs. kaolin and ball clay.

5. A Study of Bodies in the Clinoenstatite Field of the MgO–Al_2O_3–SiO_2 System

By John O. Semmelman and A. S. Watts: Department of Ceramic Engineering, Ohio State University, Columbus, Ohio

The effect of additions of SiO_2 and MgO to a steatite body was studied. A study of eyrite, a talc mineral containing fluorine, used as a plasticizer, was also made.

6. Ceramic and Electrical Properties of High-Titania Bodies

By Eugene Wainer: Titanium Alloy Manufacturing Company, Niagara Falls, N. Y.

The electrical properties of ceramic compounds of titania, their compositions, and possible commercial applications are described. The properties of these materials indicate their suitability not only as substitutes for condenser-grade mica but also for a number of electrical applications in which the use of other dielectrics is not convenient or is not possible. An attempt is made to explain, on a rational basis, the mechanism for determining the electrical properties involved, and this explanation is used in evaluating compositions. Correlations between this explanation and the experiments are given.

7. Properties of Talc Bodies Made with Foreign and Domestic Talcs

By J. F. McMahon, Milton Tuttle, and M. Burzycki: New York State College of Ceramics, Alfred, N. Y.

The properties of ceramic bodies containing foreign and domestic talcs were investigated. Physical properties and certain electrical properties as well as steatite, high-magnesia, cordierite, high-alumina, and low-talc bodies were studied.

MATERIALS AND EQUIPMENT DIVISION PROGRAM (continued)

Adonis Room

Tuesday Afternoon, April 20, 1943: 2:00 P.M.–4:30 P.M.

Chairman, Jack F. Day

Symposium on "Occurrence, Properties, and Uses of Domestic Talc"

Members of the Materials and Equipment Division will move to the Adonis Room for the Tuesday afternoon session. The papers will be continued from the paper completed at the end of the morning session. The White Wares Division, meanwhile, will remain in the Ball Room for their scheduled program of papers, listed on p. 104.

8. Canadian Talc for Steatite Insulators

By H. S. Spence, J. G. Phillips and W. T. Turrall, Bureau of Mines, Ottawa, Ontario, Canada

A description is given of the Madoc talc deposits, laboratory tests on beneficiation, and proposed operations. The suitability of this material for use in steatite porcelain will be discussed.

9. Western Talcs

By W. Wallace Roff: Whittaker, Clark, and Daniels, Inc., New York, N. Y.

Current information is presented on western talcs, including those now being produced in California, Nevada, and Montana.

10. Domestic Talcs

By T. A. Klinefelter: U. S. Bureau of Mines, Tuscaloosa, Ala.

11. Petrographic Study of Domestic Talcs

By L. H. Berkelhamer: U. S. Bureau of Mines, Tuscaloosa, Ala.

12. Beneficiation of Domestic Talcs

By Sidney Gottlieb: U. S. Bureau of Mines, Tuscaloosa, Ala.

A discussion is presented of the geologic origin and occurrences, methods of testing, and petrographic study of impurities. The commercial feasibility of flotation as a means of purification of domestic talcs is included.

13. Development of a Low-Lime, New York State Talc for Use in Steatite Insulators

By Donald Hagar and J. F. Day: For the W. H. Loomis Talc Corporation, Zanesville, Ohio

A progress report is presented pertaining to the purification of a talc from New York State suitable for use in steatite insulators.

14. Beneficiation of New York Talc

By Milton Tuttle: New York State College of Ceramics, Alfred, N. Y.

Various methods of reducing the lime and silica contents of New York tremolite talc were investigated. The flotation method, electrostatic method, and other methods were tried. Concentrates with less than 1% of lime were produced in some cases.

15. Brucite Magnesia

By M. F. Goudge: Mining Engineer, Bureau of Mines, Ottawa, Ontario, Canada

A discussion is presented of the occurrence of brucite in limestone, the method of extracting it in the form of magnesia, and the uses for which this particular type of magnesia is best suited. Its possibilities for use in the ceramic industry are emphasized.

MATERIALS AND EQUIPMENT DIVISION PROGRAM (concluded)

Ball Room

Wednesday, April 21, 1943: 9:30 A.M.–12:00 M. and 2:00 P.M.–4:30 P.M.

Symposium on "Testing and Classification of Ball Clays"

Chairman: Ralston Russell, Jr.

Members of the Materials and Equipment Division are meeting in joint session with the White Wares Division and the Enamel Division for this Symposium.

For program outline of this Symposium, see p. 106.

REFRACTORIES DIVISION PROGRAM

Chairman: R. S. Bradley, A. P. Green Fire Brick Company, Mexico, Mo.
Secretary: W. R. Kerr, Armstrong Cork Company, Beaver Falls, Pa.

Program Committee
S. M. Swain, Chairman, North American Refractories Company, Cleveland, Ohio
P. G. Herold, Department of Ceramic Engineering, Missouri School of Mines and Metallurgy, Rolla, Mo.
C. L. Norton, Jr., Babcock and Wilcox Company, 85 Liberty Street, New York, N. Y.
E. E. Callinan, Research Department, Timken Steel and Tube Company, Canton, Ohio

Hotel William Penn: Urban Room

Tuesday Forenoon, April 20, 1943: 9:30 A.M.–12:00 M.

1. Problems Encountered in the Manufacture of Ladle Brick

By Roy Morton: Evans Brick Company, Midvale, Ohio

The problems discussed in this paper are (1) selection of clay, (2) grinding, (3) deaired and nondeaired dry pressing, (4) setting and firing, and (5) desirable properties of ladle brick.

2. Development of Dry-Pressed Insulating Refractory

By Paul G. Herold, W. E. Crockett, and C. W. Dougan: Department of Ceramic Engineering, School of Mines and Metallurgy, University of Missouri, Rolla, Mo.

Insulators were made from mixtures of Fairmount clay (Tennessee carbonaceous clay), flint fire clay, semiflint fire clay, plastic fire clay, and pyrophyllite. The effects of grain size, firing temperature, percentage of component materials, percentage of water, and forming pressures were studied. The effect of the variables is related to the weight and strength of the insulator.

3. Mottled Silica Brick, Facts, Fancies, and Fallacies

By Fred A. Harvey and Clyde L. Thompson: Harbison-Walker Refractories Company Pittsburgh, Pa.

The extent of coloration is dependent on the amount of lime and alumina and on the thermal history. The coloring agent is usually iron oxide which is present in small amounts. If the iron oxide is free, the color spots appear; if it is in solution in the lime-alumina-silica glass, there is little or no coloration. The color can be cleared up or accentuated by controlled laboratory reheating, at known temperatures, for definite time intervals. The mottling does not appear unless the brick is well fired. The spots have no harmful effect. The literature on this subject is reviewed.

4. Some Factors Influencing Staining of Silica Brick

By L. J. Trostel: General Refractories Co., Baltimore, Md.

The staining of silica brick was found to occur in a critical temperature range of 900° to 1000°C. Concurrently the brick had to be "soaked" and exposed to an oxidizing atmosphere. Stained brick could be "cleaned up" or staining prevented by manipulation of the foregoing conditions as well as by additions of lime above 2.5%. The experimental data examined in relation to the system $CaO–Fe_2O_3–SiO_2$ suggest that the colorant is the mineral dicalcium ferrite.

5. Influence of Water Vapor on Silica Brick at High Temperatures

By Fred A. Harvey: Harbison-Walker Refractories Company, Pittsburgh, Pa.

Some tests are described which lead to the conclusion that water vapor has little or no effect on silica brick at temperatures of 2700° and 2900°F. This contradicts the conclusion of another investigator.

6. Control of Atmosphere in Laboratory Kilns

By C. L. Thompson: Harbison-Walker Refractories Company, Pittsburgh, Pa.

The control of kiln atmosphere in reheat, load test, and P.C.E. furnaces by the use of air-gas proportional mixers is described. The effect on the ability to reproduce test conditions is discussed.

REFRACTORIES DIVISION PROGRAM (continued)

Urban Room

Tuesday Afternoon, April 20, 1943: 2:00 P.M.–4:30 P.M.

7. Some Properties of Heat-Setting Refractory Mortars

By R. A. Heindl and W. L. Pendergast: National Bureau of Standards, Washington, D. C.

Twelve brands of the heat-setting type of refractory mortar were studied with respect to sieve analysis, pyrometric cone equivalent, mixing water, troweling, and drying properties as well as strengths after heating at various temperatures. The tendency of the mortars to shrink, crack, and adhere when exposed to high temperatures, both in fusion blocks and in units of three brick each, was also investigated.

8. Spherical Furnace Calorimeter for Direct Measurement of Specific Heat and Thermal Conductivity

By John R. Winckler: Johns-Manville Sales Corporation, New York, N. Y.

(1) A spherical calorimeter has been constructed for measuring true specific heat and thermal conductivity. The calorimeter is formed of two concentric spherical platinum shells, and it is housed in a spherical electric furnace. The sample is spherical and fitted into the inner shell; heat is supplied electrically at the center of the sample. (2) Thermal conductivity is measured by determining the inner and outer sample temperatures at steady heat flow using the equation of heat conduction in a sphere. Specific heat is measured by noting the temperature rise of the sample with a known heat input while maintaining the calorimeter shells near the adiabatic condition. Correction for heat leakage is determined by using the conductivity determination to calculate the heat leak factor. (3) Specific heat and thermal conductivity measurements have been made on quartz sand, chrome refractory cement, four types of insulating firebrick, and 85% magnesia over a total temperature range of 100° to 2200°F. The estimated accuracy of 3 to 5% of specific heat measurement is consistent with engineering requirements. No estimate of accuracy is given yet for thermal conductivity results.

9. Treatment of Silicosis

By J. W. G. Hannon, M.D.: 625–35 Washington Trust Building, Washington, Pa.

The treatment of silicosis is based on (1) prevention which may be accomplished by (*a*) pre-employment examinations consisting of careful industrial histories and clinical histories with particular reference to respiratory diseases, and complete physical examination, and laboratory examinations including, X-ray studies; (*b*) adequate practical dust control; and (*c*) the administration of metallic aluminum when the first two means are inadequate; and (2) the treatment of disabled workmen by metallic aluminum.

This paper deals principally with the use of metallic aluminum in the treatment of workmen who have been disabled in the ceramic industry. Aluminum is not a cure for silicosis, but its use is followed by many beneficial results, particularly the alleviation of symptoms and an increased capacity for work. This study is based on the results obtained from the treatment of a series of approximately fifty men, thirty-two of whom already showed marked disability. The others were treated on the basis of prophylaxis.

Discussion by Paul G. Bovard, M.D.

REFRACTORIES DIVISION PROGRAM (continued)

Urban Room

Wednesday Forenoon, April 21, 1943: 9:30 A.M.–12:00 M.

10. Measurement of Thermal Conductivity of Fire-Clay Refractories

By T. C. Patton and C. L. Norton, Jr.: Babcock and Wilcox Company, New York, N. Y.

Thermal conductivity determinations have been made on fire-clay, silica and kaolin refractories, using the Globar heated, water calorimeter apparatus previously described. The arrangement, which is satisfactory for insulating firebrick, gives considerable error when firebrick samples are tested. Results obtained by different arrangements of the guard samples and heating elements are shown as well as a final arrangement which gives a satisfactory condition of parallel heat flow.

11. Substitution of Topaz, Domestic Kyanite, and Synthetic Mullite-Corundum for India Kyanite

By T. N. McVay: Department of Chemistry, University of Alabama, University, Ala.; and Hewitt Wilson: Electrotechnical Laboratory, U. S. Bureau of Mines, Norris, Tenn.

The utilization of domestic materials as replacements for India kyanite is described. The report is divided into four parts, namely, (1) kyanite and other high-grade refractories, (2) effect of heat on kyanite and topaz, (3) load resistance of refractories at elevated temperatures, and (4) resistance of refractories to thermal shock.

12. Making Low-Cost Firebrick by Using Fire Clay Fired at Low Temperatures

By H. G. Schurecht, R. B. Burdick, and G. A. Jones: New York State College of Ceramics, Alfred, N. Y.

The properties of fire-clay refractories made by the new Russian development were studied; 90% grog fired at low temperatures (900° to 1500°F.) was mixed with 10% bond clay, and the brick were dry pressed. Economical advantages of the new process were investigated.

13. Use of Slips, Deflocculents, and Hot Water in the Preparation of Fire Clay-Grog Bodies

By Walter A. Hedden: New York State College of Ceramics, Alfred, N. Y.

By adding the bond clay to grog bodies as a slip in place of dry clay, improvements in properties of the refractory body were produced. Organic deflocculents and hot water also produced marked improvements in the properties of bodies without decreasing the refractoriness of the bodies as is the case when inorganic deflocculents are used.

14. The Disintegration of Fire-Clay Refractories by CO Gases

By J. F. McMahon and James R. Tinklepaugh: New York State College of Ceramics, Alfred, N. Y.

The influence of various iron-bearing impurities in fire clay on the disintegration of fire-clay refractories was studied. Special attention was paid to the effect of fineness of the different impurities on carbon monoxide disintegration.

Refractories Division Luncheon and Business Meeting

Urban Room

Wednesday Noon, April 21, 1943: 12:30 P.M.–2:00 P.M.

REFRACTORIES DIVISION PROGRAM (concluded)

Urban Room

Wednesday Afternoon, April 21, 1943: 2:00 P.M.–4:30 P.M.

15. Observations on Solid-Phase Inversions of Calcium Orthosilicate, a Constituent of Dolomite-Silica Brick

By Samuel Zerfoss: Department of Ceramics; and H. M. Davis: Department of Metallurgy, Pennsylvania State College, State College, Pa.

The solid solution of P_2O_5 in calcium orthosilicate has been studied by thermal and optical methods. The inversion temperature for the alpha-to-beta C_2S change was found to be lowered by the presence of the dissolved P_2O_5. With this information, a probable mechanism is presented for the inhibiting effect of P_2O_5 and similar oxides on the beta-gamma inversion (dusting) of C_2S. Two new inhibiting oxides are listed. Two types of inhibition of the beta-gamma inversion are recognized, namely, (1) *physical*, wherein the constraint imposed by the surroundings acts to prevent the inversion and to interrupt the continuity of the inversion wave, and (2) *chemical*, wherein the presence of foreign dissolved substances produce an apparent stability in the beta lattice at room temperature. The information is applied to the problem of the stabilization of C_2S in dolomite or lime-silica brick.

16. The System Magnesium Oxide–Boric Oxide

By H. M. Davis: Department of Ceramics, Pennsylvania State College, State College, Pa.; and M. A. Knight: 716 N. McKean St., Butler, Pa.

Phase equilibrium in part of the system has been investigated, and the corresponding phase equilibrium diagram has been constructed. Three intermediate compounds are present; $MgO \cdot B_2O_3$ melts incongruently at 988°C. to form $2MgO \cdot B_2O_3$ and a liquid containing more than 99% by weight of B_2O_3. The other two compounds melt congruently, $2MgO \cdot B_2O_3$ at 1340°C., and $3MgO \cdot B_2O_3$ at 1366°C. At 1142°C., a region of liquid immiscibility extends from 0.6 to 36.0% by weight of MgO. Temperatures are accurate within 5°C. Conflicts between these results and those of Toropov and Konovalov (*Chem. Abs.*, **35,** 3886 (1941)) are discussed.

17. Investigation of Reactions of Simple Magnesia Spinels with Alkaline Earth Orthosilicates in the Solid State

By V. D. Fréchette: Corning Glass Works, Corning, N. Y.; and A. I. Andrews: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

The spinels $MgO \cdot Al_2O_3$, $MgO \cdot Cr_2O_3$, and $MgO \cdot Fe_2O_3$ and the orthosilicates $2MgO \cdot SiO_2$, $2CaO \cdot SiO_2$, $2SrO \cdot SiO_2$, and $2BaO \cdot SiO_2$ were synthesized by solid state reaction of the component oxides (or compounds yielding the oxides on ignition). At various temperatures, each of the spinels was tested with each orthosilicate in turn by placing a pellet of each in contact and by intimately mixing the two. Petrographic microscopy and X-ray diffraction were employed in the identification of reaction products.

STRUCTURAL CLAY PRODUCTS DIVISION PROGRAM

Chairman: R. A. Shipley, National Fireproofing Corporation, Pittsburgh, Pa.
Secretary: E. F. Theobald, Metropolitan Paving Brick Company, Canton, Ohio

Program Committee
R. L. Stone, Chairman, Department of Ceramic Engineering, University of North Carolina, Raleigh Unit, Raleigh, N. C.
J. H. Isenhour, Isenhour Brick and Tile Company, Inc., Salisbury, N. C.
V. W. Boeker, Richards Brick Company, Edwardsville, Ill.

Hotel William Penn: Silver Room

Tuesday Forenoon, April 20, 1943: 9:30 A.M.–12:00 M.

1. Vermiculite as a Raw Material in Ceramic Manufacture

By Bruce Blount and F. K. Pence: Bureau of Industrial Chemistry, University of Texas, Austin, Texas

Expanded vermiculite has been studied for use with a low vitrifying plastic clay bond to form structural clayware such as partition tile and bathroom tile which may carry glazed coatings in decorative effects. The advantage of this material is its low thermal conductivity, its relatively high strength as compared to its specific gravity, and the ease with which it can be cut and fitted into installations.

2. Controlled Drilling and Blasting in Clay Mines

By Clyde Augsburger: National Fireproofing Corporation, Canton, Ohio

Drilling and blasting in clay mines can be placed on a very efficient basis by detailed study and supervision. Controlled drilling and blasting results in more uniform mixture of top and bottom clay producing a better product at the plant. Importance of spacing, direction, and loading of boreholes is discussed. Handling of explosives, safety precautions, and personnel are also discussed briefly.

3. Differential Thermal Analysis of Clays and Shales, a Prospecting Method

By Ralph E. Grim and Richards A. Rowland: Illinois State Geological Survey Division, University of Illinois, Urbana, Ill.

Differential thermal analysis is presented as a method for evaluating accurately and quickly the properties of clay materials. Information may be obtained in less than two hours on the composition and therefore on the green and fired properties of clay materials. Differential thermal curves are presented (*a*) for pure clay minerals, (*b*) for the pure forms of other components (quartz, pyrite, organic materials, etc.) of clays and shales, (*c*) for synthetic mixtures of the clay minerals and the various other clay components, and (*d*) for all common types of clay materials. The significance of these curves is discussed, particularly in relation to the composition and to the plastic and fired properties of clays and shales.

4. Making Lightweight Refractories in a Brick Plant

By H. G. Schurecht and W. A. Heddon: New York State College of Ceramics, Alfred, N. Y.

Experiments were conducted to determine whether the shrinkage could be removed from insulating firebrick at the low temperatures obtained in brick kilns by adding various materials to the bodies. Ball clay, topaz, and borax additions were found promising for this purpose.

STRUCTURAL CLAY PRODUCTS DIVISION PROGRAM (continued)

Silver Room

Tuesday Afternoon, April 20, 1943: 2:00 P.M.–4:30 P.M.

2:00–2:30 P.M.

5. Development of Standard Wicks for Efflorescence Tests

By H. G. Schurecht and J. F. McMahon: New York State College of Ceramics, Alfred, N. Y.

Standard wicks were developed to measure efflorescence from mortars and brickwork. Underfired brick in some cases developed considerable efflorescence, whereas the same brick fired to a slightly higher temperature was practically free from efflorescence. Severe cases of efflorescence also originate from the Portland cement and lime in the mortars.

2:30–3:00 P.M.

6. Brick Plant War Conversion and Postwar Planning

By L. R. Whitaker: Carolina Ceramics, Incorporated, Columbia, S. C.

A method for securing new business connected with the war effort and opportunities for the brick plant other than

brick and tile production are outlined. Those brick and tile plants that survive the war must begin now to prepare for radical changes and must know what these changes are.

3:00–3:30 P.M.

7. Modular Size of Clay Products Units

By C. F. Wanner and Harry C. Plummer: Structural Clay Products Institute, 1756 K Street, N. W., Washington, D. C.

In cooperation with the Modular Service Association, studies have been made during the past two years on present unit masonry sizes as used in conventional building construction and their adaptability to a coordinated system. It was found that a significant relationship exists between present unit sizes in height, thickness and length and a 4-inch modular dimension. There is little consistency, however, in the assembly of these units in similar or composite walls and far less in the coordination with component building materials and equipment.

Recommendations are made for single masonry units based on whole multiples of 4 inches with consideration given to the various joint thicknesses. Methods are shown of relating unit sizes in fractional multiples of 4 inches plus mortar joints to the grid pattern. Suggestions for standardization of unit sizes are proposed to obtain maximum simplification and corresponding economy to meet postwar construction requirements.

3:30–4:00 P.M.

8. Dri-Speedwall Products (Movie)

By R. A. Shipley: National Fireproofing Corporation, Pittsburgh, Pa.

The special processes for producing Dri-Speedwall products and methods of using them are shown.

STRUCTURAL CLAY PRODUCTS DIVISION PROGRAM (continued)

Silver Room

Wednesday Forenoon, April 21, 1943: 9:00 A.M.–12:00 M.

Symposium on "War Conversion from Brick to Hollow Tile Manufacture"

9:30–10:00 A.M.

9. Discussion on "Type of Auger Best Suited for Hollow Tile Production When Converting from Brick to Hollow Tile Manufacture"

Led by J. G. Seanor: Bonnot Company, Canton, Ohio; and J. H. Isenhour: Isenhour Brick and Tile Company, Inc., Salisbury, N. C.

10:00–10:30 A.M.

10. Discussion on "Proper Metals, Length, and Taper for Hollow-Ware Dies and Effect of Space Between Auger and Die"

Led by A. B. Christopher: Chambers Brothers Company, Philadelphia, Pa.; and H. K. Lynn: Summitville Face Brick Company, Summitville, Ohio

10:30–11:00 A.M.

11. Discussion on "Properly Grinding and Pugging Clay for Hollow-Ware Manufacture"

Led by Maurice Corbman: Cunningham Brick Company, Thomasville, N. C.

11:00–11:30 A.M.

12. Discussion on "Practical and Impractical Aspects of Die Lubrication in Hollow-Ware Production"

Led by V. W. Boeker: Richards Brick Company, Edwardsville, Ill.

11:30 A.M.–12:00 M.

13. Discussion on "Some Common Faults in Average Drying Practice and Their Remedies"

Led by L. R. Whitaker: Carolina Ceramics Incorporated, Columbia, S. C.

Structural Clay Products Division Luncheon and Business Meeting

Silver Room

Wednesday Noon, April 21, 1943: 12:30 P.M.–2:00 P.M.

STRUCTURAL CLAY PRODUCTS DIVISION PROGRAM (concluded)

Silver Room

Wednesday Afternoon, April 21, 1943: 2:00 P.M.–4:30 P.M.

2:00–2:50 P.M.

14. Discussion on "Your Individual Plans for Postwar Operations"

LED BY R. A. SHIPLEY: National Fireproofing Corporation, Pittsburgh, Pa.

2:50–3:30 P.M.

15. Discussion on "Low-Temperature, Large Air-Volume Drying vs. High-Temperature, Small Air-Volume Drying for Hollow Ware"

LED BY R. R. ROBINSON: Robinson Ventilating Company, Zelienople, Pa.

3:30–4:30 P.M.

16. Rate of Water Loss in the Drying of Brick

BY R. K. HURSH: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

Experimental data are presented on the drying of single brick under controlled atmospheric conditions. The behavior of shrinking and nonshrinking bodies is compared. The changes in rate of water loss with the decrease in moisture content show characteristic stages in the drying process.

WHITE WARES DIVISION PROGRAM

Chairman: F. C. Henderson, Royal China Company, Sebring, Ohio
Secretary: J. R. Beam, Universal Sanitary Manufacturing Company, New Castle, Pa.

Program Committee
J. W. Whittemore, Chairman, Virginia Polytechnic Institute, Blacksburg, Va.
H. L. Latimer, 313 West Court St., Apartment 304, Flint, Mich.
C. M. Lambe, Jr., University of North Carolina, Raleigh, N. C.

Hotel William Penn: Ball Room

Tuesday Forenoon, April 20, 1943: 9:00 A.M.–12:00 M.

Symposium on "Occurrence, Properties, and Uses of Domestic Talc"

Joint Chairmen: Jack F. Day, Donald Hagar Ceramic Materials, Zanesville, Ohio
C. M. Lambe, Jr., Department of Ceramic Engineering, University of North Carolina, Raleigh, N. C.

Members of the White Wares Division are meeting in joint session with the Materials and Equipment Division for this Symposium.

The officers of the Materials and Equipment Division have arranged that part of the Program relating to the occurrence, properties, and beneficiation of talcs, and the officers of the White Wares Division have arranged that portion describing the manufacture of products and the properties of the products. Particular emphasis will be placed on the production of steatite porcelain.

For this Program outline, see p. 95.

WHITE WARES DIVISION PROGRAM (continued)

Ball Room

Tuesday Afternoon, April 20, 1943: 2:00 P.M.–4:30 P.M.

Chairman: F. C. Henderson, Royal China Company, Sebring, Ohio

1. Casting Characteristics of Clays: I, Improved Methods for Determination

By W. C. Mohr and R. Russell, Jr.: Research Laboratories, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Part I of this investigation covers the development of reliable laboratory tests to indicate the relative properties of different clays with the primary consideration of their casting behavior. Methods are given for the determination of casting rate, permeability, water retention, viscosity, thixotropy, shrinkage, and dry strength. By determining the effect of varying increments of electrolyte on the foregoing properties, it is possible to select clays which have desirable casting characteristics for commercial use. Samples of fast- and slow-casting kaolins and ball clays were used to indicate the utility of the methods employed, and results are also given for a composite body. In developing those test procedures using the Buechner funnel (vacuum), the effect of the following factors was determined: mixing procedure, ratio of clay to flint, feldspar vs. flint as the nonplastic, electrolyte content, quantity of slip used, specific gravity of slip, slip temperature, aging, pressure, and equipment variations. After consideration of these factors, the optimum procedure for testing clays was evolved.

2. Casting Slip Control

By A. S. Watts: Department of Ceramic Engineering, Ohio State University, Columbus, Ohio

3. Some Particulate Characteristics of Commercial Flint and Feldspar

By R. S. Weisz and R. Russell, Jr.: Research Laboratories, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

An investigation has been made of the particle-size variations of seven shipments of commercial flint and fifteen shipments of feldspar as possible causes of production variations in electrical porcelain. Seven grades of commercial flint were also tested in an attempt to correlate sieve data with specific surface calculations based upon sedimentation determinations. The Andreasen pipette sedimentation method was used for all tests except those in which the hydrometer method was selected for comparison in order to develop a more rapid procedure for commercial usage. Particle-size distribution was determined for each sample; to facilitate comparisons, however, specific surface values were translated by use of a special and satisfactory method which involves plotting the dis-

tribution data on log-probability paper. The investigation included the effect of various liquid suspending mediums and electrolytes on the settling characteristics of flint and feldspar. Feldspar was found to be markedly affected by the type of suspending medium used, and it apparently has active surface characteristics which permit it to be flocculated or deflocculated. An anomalous deflocculation of a feldspar sample in the particle-size range below 2.5 microns is discussed. The necessity of considering feldspar in a different light from flint in bodies in the slip or plastic state is indicated.

4. A Study of the Quantitative Determinations of the Glassy Phase in a Ceramic Body

By Arnold Johnson: 2273 Glenwood Avenue, Toledo, Ohio

A study was made of the amount of glassy bond present in a typical whiteware body after various heat-treatments. Petrographic methods with polished sections and powder mounts were used for these determinations.

5. Influence of Glaze Penetration and Reaction of Glazes with Bodies on Glaze Fit

By E. W. Miller: New York State College of Ceramics, Alfred, N. Y.

The effect of twenty-four different oxides when used in the RO of a base glaze on the penetration and reaction of these glazes with semivitreous, hotel china, terra cotta, steatite, talc, wall tile, and pyrophyllite bodies was studied. Penetration tests often indicate which type of glaze is best suited for different bodies.

6. Study of Some Factors Involved in Glaze Slip Control, II

By C. G. Harman and M. K. Blanchard: Department of Ceramic Engineering, University of Illinois, Urbana, Ill.

The investigation was directed toward the satisfactory application of the coherence test (reported earlier), together with some measurable body properties, to the more general problems of glaze slip behavior and control. An attempt was made to correlate the thickness of deposition of glazes on bodies with the air permeabilities of the bodies and the consistency of the slip measured by the coherence method. This correlation was found to be satisfactory under certain restricted circumstances but not for general use. A satisfactory correlation, independent of the type of body, between glaze consistency (coherence values) and water receptivities of the bodies was obtained. Examples are given of the application of the methods to glaze slip control.

7. Study of Some Factors Involved in Glaze Slip Control, III

By C. G. Harman and H. C. Johnson: University of Illinois, Urbana, Ill.

Further work has been done with the "pick-up method" of glaze slip control. Additional types of glazes have been studied, and improvements in technique and apparatus are described. The correlation between glaze consistency, body receptivity, and thickness of glaze deposition may be represented by a simple first order equation having two constants; that is, $PK\left(\frac{R}{100}\right) = (C - 0.002)$, wherein P = pick-up, K = deposition constant, R = receptivity, and C = coherence value.

8. Study of Some Factors Involved in Glaze Slip Control, IV

By C. G. Harman and H. C. Johnson: University of Illinois, Urbana, Ill.

Coherence values, measured by the amount of slip adhering to a glass plate when withdrawn at a uniform velocity for a reservoir of slip, have several practical applications. Coherence-value measurements may be used (1) to check incoming raw materials, (2) as a basis of selection of certain raw materials, (3) as a control test to determine the constancy of slip consistency, and (4) as a control test at any point in the processing of slip. By correlating and associating coherence values with other factors, a remedy will be evident if the slip is off-standard. The measurement of receptivity is a simple test; it is useful for determining the constancy of the processing and will provide a useful check of the suitability of the ware for glaze application. These methods of testing hold promise of general application in fields other than glaze control.

WHITE WARES DIVISION PROGRAM (continued)

Ball Room

Wednesday Forenoon, April 21, 1943: 9:30 A.M.–12:00 M.

Symposium on "Testing and Classification of Ball Clays"*

Chairman: Ralston Russell, Jr., Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Members of the Enamel Division and Materials and Equipment Division are meeting in joint session with the White Wares Division for the papers and discussions listed on this program.

This Symposium is a continuation of a similar symposium presented at the Forty-Fourth Annual Meeting in Cincinnati, Ohio. The discussion outline is to be considered by an Advisory Committee on Sunday, April 18, and the Committee members will present various phases of the problem during the Symposium. Only a section of the outline will be considered at this Meeting, and the remainder will be reserved for future meetings of the Division

Advisory Committee

Chairman: RALSTON RUSSELL, JR.
J. R. BEAM: Universal Sanitary Manufacturing Co., New Castle, Pa.
R. E. GOULD: Buffalo Pottery Co., Buffalo, N.Y.
A. J. HEDQUIST: Taylor, Smith, and Taylor Co., Chester, W. Va.
JOHN R. KAUFFMAN: Allied Engineering Co., Milltown, N. J.
EDWARD SCHRAMM: Onondaga Pottery Co., Syracuse, N. Y.
HARRY THIEMECKE: Homer Laughlin China Co., Newell, W. Va.
L. E. THIESS: General Electric Co., Schenectady, N. Y.
A. S. WATTS: Ohio State University, Columbus, Ohio
J. W. WHITTEMORE: Virginia Polytechnic Institute, Blacksburg, Va.
HEWITT WILSON: Electrotechnical Laboratory, U. S. Bureau of Mines, Norris, Tenn.
V. J. ROEHM: Kentucky Clay Mining Company, Mayfield, Ky.

I. Basic Classification Methods

1. Laboratory testing of individual clays
2. Plant testing of bodies

II. Selection and Preparation of Representative Clay Samples

1. Mine vs. plant selection
2. Lump clay vs. air-floated clay
3. Wet clay vs. dried clay
4. Drying procedures
5. Storage and distribution of samples to investigators

III. Standard Compositions

1. Clay vs. clay-flint vs. standard body mixtures
2. Choice of standard materials; water selection
3. Compensation for moisture in materials

IV. Specimen Preparation

1. Specimen shapes and dimensions
2. Number of specimens required

(*A*) *Plastic Process*

(1) Batch quantity
(2) Slurry-dewatering preparation vs. dry-mixing preparation; water temperature
(3) Aging
(4) Deairing vs. hand wedging
(5) Standardization of moisture content for molding; method of determination
(6) Plastic pressing vs. plastic extrusion vs. semidry pressing vs. dry pressing
(7) Drying procedure
(8) Storage of test specimens

(*B*) *Casting Process*

(1) Batch quantity
(2) Ball milling vs. agitation
(3) Dewatering treatment vs. single-process method
(4) Water content and temperature: (*a*) sta .dardization of electrolyte; (*b*) effect of electrolyte content
(5) Casting slip control; temperature, aging
(6) Properties of casting slip: viscosity, specific gravity, casting rate, percentage of water retention, permeability, thixotropic character
(7) Drying procedure
(8) Storage

V. Determination of Unfired Properties

1. Water retained in formed specimen
2. Drying shrinkage
3. Drying characteristics: cracking and warping
4. Dry transverse strength

VI. Firing Procedure

1. Type of kiln
2. Rates of heating and cooling; amount of soaking
3. Type of kiln atmosphere
4. Selection of firing range
5. Setting methods

VII. Determination of Fired Properties

1. Firing shrinkage
2. Fired color and appearance
3. Absorption
4. Compressive strength
5. Impact strength
6. Transverse strength
7. Modulus of elasticity
8. Specific gravity: true and apparent
9. Coefficient of thermal expansion
10. Heat-shock resistance
11. Warpage
12. Translucency
13. Moisture expansion

* Discussion of the latter parts of this outline will take place at a subsequent meeting.

VIII. Miscellaneous Properties of Clays

1. Particle size
2. Particle shape
3. Character and amount of soluble salts
4. Hydrogen-ion determination
5. Character and amount of exchangeable bases
6. Character and amount of organic constituent
7. Oxidation of organic constituent
8. Chemical analysis
9. Mineralogical and rational analyses
10. Plastic properties: (*a*) yield point; (*b*) cohesion; (*c*) lubricity; (*d*) workability; (*e*) plasticity
11. Deflocculation behavior

11:15 A.M.–12:00 M.

A Progress Report of the Whiteware Division Standards Committee

By F. P. Hall: Onondaga Pottery Company, Syracuse, N. Y.

White Wares Division Luncheon and Business Meeting

Ball Room

Wednesday Noon, April 21, 1943: 12:30 P.M.–2:00 P.M.

Members of the Enamel Division meeting with the Materials and Equipment and White Wares Divisions for this Symposium will adjourn to the Adonis Room for their Luncheon and Business Meeting. Following the luncheon, they will again join in the White Wares Division Program being held in the Ball Room.

WHITE WARES DIVISION PROGRAM (concluded)

Ball Room

Wednesday Afternoon, April 21, 1943: 2:00 P.M.–5:00 P.M.

9. Use of the Brabender Plastograph for Measuring Workability and Plasticity of Ball Clay and Jiggering Bodies

By H. G. Schurecht and Marvin Britton: New York State College of Ceramics, Alfred, N. Y.

The Brabender plastograph was modified to give curves free from the large oscillations which are too frequently encountered when the instrument is not properly adjusted. The instrument can be used to evaluate plasticity of ball clays, jiggering bodies, and other plastic materials of similar nature. Unlike other plastographs, it may be used to determine in one run the plasticity for all water contents.

10. Effect of Various Deflocculents on Modulus of Rupture of Plaster Molds

By Willard J. Sutton: New York State College of Ceramics, Alfred, N. Y.

Plaster bars, 1 by 1 by $4^1/_2$ in. in size, were cast in glass-lined molds. Each batch was tested, and bars were then dipped in a commercial vitreous body slip deflocculated with several organic and inorganic deflocculents. The bars were dipped from two to ten times to simulate the casting process. After stripping off the body and drying the bars, their strength was determined.

11. Prestite, Improved Method of Molding Electrical Porcelain

By E. H. Fischer: Westinghouse Electric & Manufacturing Company, Derry, Pa.

The term, Prestite, implies a new method for the manufacture of absolutely vitreous electrical porcelain. The Prestite method involves pressing of ceramic compositions in metal dies under specially controlled conditions. Hydraulic presses are preferred for use with the Prestite process. By the proper application of ceramic materials to the die, evacuation of the specially sealed die, and controlled manipulation in the application of pressure, nonporous ceramic ware is produced. Ceramic ware formed in steel dies possesses greater dimensional fidelity than is practically possible with other methods and, in addition, quite intricate shapes may be produced. The fact that these advantages may be coupled with the production of nonporous ware from a variety of body compositions makes the Prestite method of manufacture commercially useful. A discussion of the methods of manufacture, properties, and uses of Prestite porcelain are included.

12. Duplication of Chrome-Brown Electrical Porcelain Glazes With Nonessential Materials

By R. B. Fuller and A. S. Watts: Department of Ceramic Engineering, Ohio State University, Columbus Ohio

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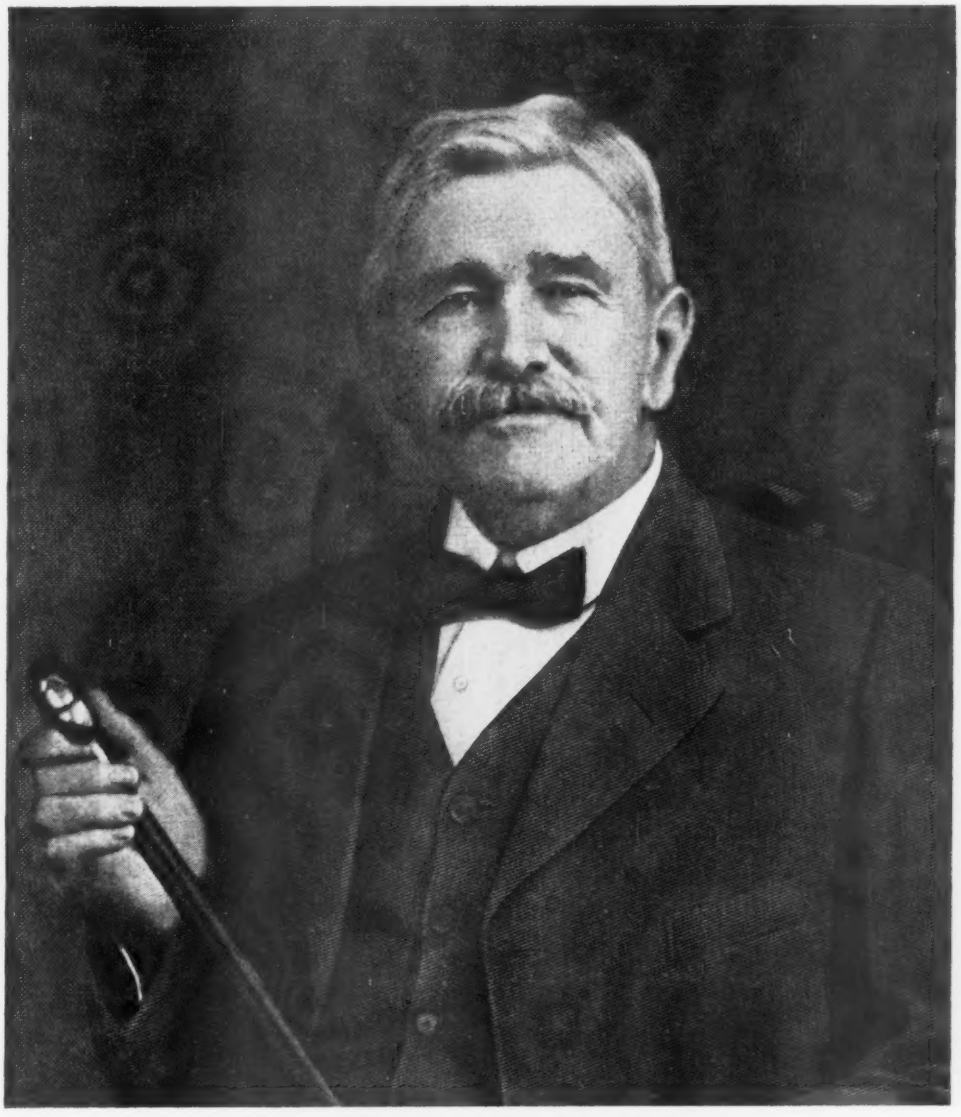


JAMES COLUMBUS STEELE

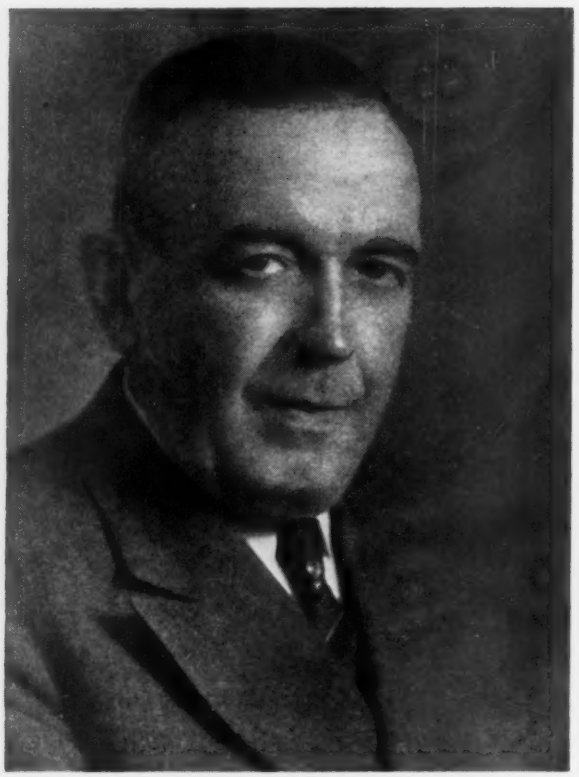
J. C. STEELE & SONS

J. C. Steele & Sons, manufacturers of clayworking machinery, is one of the outstanding industrial enterprises of Statesville, North Carolina. It was established in 1889 by James Columbus Steele, who invented and patented a brick truck which found a ready sale among the brickmakers of the country and in 1885 manufactured the brick for the Cooper House, a historic hostelry of this section of North Carolina which later became the Hotel Iredell. This new business of James Steele's gradually developed, his sons became actively engaged in the ownership and management of the enterprise, and today the Company manufactures a complete line of clayworking machinery which is sold in all parts of the United States and (in ordinary times) in such foreign lands as Australia, New Zealand, South America, South Africa, and Europe. A late development of the Company has been a deairing

machine which produces a superior grade of brick and tile.

James C. Steele, who continued in active business until his death in 1922 at the age of eighty-two, was born in Iredell County, North Carolina, a son of John M. and Elizabeth Bell Steele. John Steele, a farmer, was a son of Ninian and Elizabeth Chambers Steele, who had moved from Chambersburg, Pennsylvania, to North Carolina to settle near Elmwood in Iredell County. Ninian Steele devoted his attention to farming, owned a large number of slaves, and manufactured one of the first cotton gins before Eli Whitney brought out his invention. James Steele's grandparents on the maternal side were William Thomas (whose ancestors came from Scotland) and Elizabeth Crawford Montgomery.

James Steele served in the Confederate Army through the four years of the Civil War and then engaged in the lumber business before organizing the present J. C. Steele & Sons. To him and his wife, Dora Montgomery Steele, were born four sons (three of whom are still identified with J. C. Steele & Sons) and one daughter, namely, Clarence M., Henry Oscar, Alexis P., Flake F., and Elizabeth. The family all hold to the Presbyterian faith and have been helpfully interested in church work.



Henry Oscar Steele

J. C. Steele & Sons is an unincorporated family affair. They employ one hundred men and have salesmen on the road, including James C. Steele II and A. P. Steele, Jr. The Company has four different plants: one at Statesville, one a short distance west of Statesville, another at Pine Hall, North Carolina, and a terra-cotta plant at Madison, North Carolina. The Statesville plant, the largest of the four, is modern in its equipment and has a spacious office.

James C. Steele II

The Statesville Brick Company, a subsidiary of J. C. Steele & Sons, which was in operation for many years before its reorganization in 1920, is managed by E. R. Rankin, son-in-law of J. C. Steele. Clarence, Alexis, and Flake Steele are also associated with this Company. Their products include common and face brick and hollow tile and the plant is situated at Buffalo, near the Catawba River.

The son of E. R. Rankin is superintendent of the Pine Hall plant of J. C. Steele & Sons.

Death of Henry Oscar Steele

Henry Oscar Steele, second son of James C. Steele, died January 8, 1942, following a stroke of paralysis at the age of sixty-seven.

He was born at Cool Springs, Iredell County, and received his early education at Cool Springs and at Statesville Academy.

Prominently identified with civic and religious affairs for many years, Mr. Steele was a director of the Peoples Loan and Savings Bank and president of the Vance Hotel Company. He had been a member of the First Presbyterian Church and for more than twelve years had served as a deacon. He was also a choir member.

In addition to his three brothers and one sister, Mr. Steele was survived by his widow, Annie Parker, a daughter, Rosalie, and his son, J. C. Steele II.

Data from North Carolina, the Old North State and the New, Volume 5, and from a Statesville, North Carolina, newspaper.

WAR CONGRESS

FORTY-FIFTH ANNUAL MEETING

Hotel William Penn, Pittsburgh, Pa., April 18, 19, 20, and 21

OUR SPEAKERS*

JOHN GABBERT BOWMAN

John Gabbert Bowman, chancellor of the University of Pittsburgh, Pittsburgh, Pa., was born in Davenport, Iowa, May 18, 1877, the son of John R. and Mary Gabbert Bowman.

John Gabbert Bowman

He was graduated from the State University of Iowa with the B.A. degree in 1899 and received the M.A. degree in 1904. He also received the LL.D. degree from Coe College, 1912; the University of Mississippi, 1914; Boston University, 1927; Rutgers University, 1933; and the University of Pennsylvania, 1934, and the Litt.D. degree from Oglethorpe University, 1924, and the University of Iowa, 1934.

From 1899 to 1901, Dr. Bowman was engaged in newspaper work, and from 1902 to 1904, he was instructor of English at the State University of Iowa and at Columbia University from 1905 to 1907. From 1907 to 1911, he was secretary of the Carnegie Foundation for the Advancement of Teaching, New York, and from 1911 to 1914, he was president of the State University of Iowa. From 1915 to 1921, he was director of the American College of Surgeons. He has held his present position of Chancellor of the University of Pittsburgh since 1921.

Dr. Bowman has been trustee of the National Board of Medical Examiners, Philadelphia, Pa. (1915–1931), consultant on hospitals for the U. S. Treasury Department (1921–1923), director of the Pittsburgh Chamber of Commerce (1922–1926), and is at present director of the Forbes National Bank. He is also chairman of the board of the Pittsburgh Chemical Warfare Procurement District and trustee of the Henry C. Frick Educational Commission.

In 1940, Dr. Bowman was decorated with the Order of St. Sava (Jugoslavia).

He has been a member of The American Ceramic Society since 1937 and is also a member of the University Club, the Duquesne Club, and the Pittsburgh Athletic Club.

Dr. Bowman is the author of numerous magazine articles and of The World That Was.

AMORY HOUGHTON

Amory Houghton, chairman of the Board of Directors, Corning Glass Works, Corning, N. Y., was born in Corning,

Amory Houghton

* See Annual Meeting Program, this issue, p. 83

A biographical sketch of Francis R. Holden, who will also speak during this session, was published in the March, 1943, *Bulletin*, p. 69.

July 27, 1899, the son of Alanson B. and Adelaide Wellington Houghton. From 1913 to 1917, he attended St. Paul's School, Concord, N. H., and in 1921 he received the B.A. degree from Harvard University, Cambridge, Mass.

Associated with the Corning Glass Works since 1921, Mr. Houghton has served successively as assistant to the president, 1926–1928; executive vice-president, 1928–1930; and president, 1930–1941. He is also vice-president and director of the Blue Ridge Glass Corporation and director of the Hartford-Empire Company, L'Electro Refractories, Corning Trust Company, Steuben Glass, Inc., Steuben Securities Corporation, Corning Realty Corporation, Pittsburgh-Corning Corporation, National City Bank, Owens-Corning Fiberglas Corporation, and the Metropolitan Life Insurance Company. In addition, Mr. Houghton is serving as trustee of the University of Rochester, St. Paul's School, and the Arizona Desert School, Tucson, Ariz.

He has been a member of The American Ceramic Society since 1941 and is a member of the Union, University, and Harvard clubs.

KIRK MILES

Kirk Miles, a civil engineer, attained his training at Stanford University and at the Massachusetts Institute of Technology. He has been working for the Shell Development Company and is now Senior Liaison Representative for the National Roster of Scientific and Specialized Personnel, War Manpower Commission, Washington, D. C.

DOUGLAS WHITLOCK

Douglas Whitlock, general counsel for the Structural Clay Products Institute, Washington, D. C., was born in Terre Haute, Ind., October 3, 1904.

Following his graduation from the Indiana State Normal High School, he attended Indiana University, where he received the B.S. degree from the School of Business Administration in 1926. In 1928, he received the LL.B. degree from the Indiana University School of Law.

Kirk Miles

Douglas Whitlock

MEMBERS IN SERVICE

The following members of this Society are in fighting units of war service. There are several in service in Washington not included in this Service Roster. This list, which was begun in September, 1942, and added to each succeeding month, is probably not complete, and we would appreciate information on other members.

(159) Alfred W. Allen, Harbison-Walker Refractories Co., Pittsburgh, Pa.
(160) Edward Forst, Jr., Anchor-Hocking Glass Corp., Lancaster, Ohio.
(161) William J. Knapp, North American Cement Corp., Catskill, N. Y.
(162) L. N. Larson, Missouri School of Mines and Metallurgy, Rolla, Mo.
(163) Howard J. Orlowski, Engineering Experiment Station, Ohio State University, Columbus, Ohio.
(164) C. Eldyn Washburn, Babcock & Wilcox Co., Augusta, Ga.
(165) William E. Welliver, Georgia Kaolin Co., Elizabeth, N. J.
(166) Tracy A. Willmore, Jr., Atlas Lumnite Cement Co., Gary, Ind.

In 1929, Mr. Whitlock became a member of the law firm of Sanders, Gravelle, Whitlock & Howrey. From 1933 to 1935, he was also general counsel for the Structural Clay Products Industry Code under NRA. He has been general counsel for the Structural Clay Products Institute since 1936.

Norman L. Bowen
Edward Orton, Jr., Fellow Lecturer

For abstract of Dr. Bowen's lecture, see Annual Meeting Program, p. 84, this issue. A biographical sketch of Dr. Bowen was published in *Bull. Amer. Ceram. Soc.*, **21** [1] 4 (1942).

OUR NEW OFFICERS

CECIL EUGENE BALES

President of The American Ceramic Society, 1943–1944

Biography

Cecil Eugene Bales, Vice-President of The Ironton Fire Brick Co., Ironton, Ohio, was born October 23, 1897, at Livingston, Ky. His father died when he was two years old and he then moved to Louisville, Kentucky, where he attended grade school and was graduated from Du Pont Manual Training High School in 1916. He sold papers on Sunday and worked as a clerk in a grocery store starting when he was nine years old and continuing until he finished high school. He was president of his class for three years and was graduated with special honors in science.

Cecil took several courses in chemistry, geology, and mineralogy at the University of Chicago and a course in mining at the University of Kentucky but was financially unable to complete his collegiate training. He, however, completed courses in Modern Production Methods, Industrial Management, and Business Management from La Salle Extension University.

Cecil has always been intensely interested in mineralogy. He maintains an unusually fine collection and has done considerable work on the fluorescence of minerals.

During World War I, he served in the Construction Division of the Quartermaster Corps. After that, he worked for the Standard Oil Company of Kentucky in a Burton cracking plant. He also did experimental work on the aluminum chloride and vapor-phase cracking processes.

He was associated with the Louisville Fire Brick Works as a ceramic chemist from 1920 to 1924, when he was made Assistant Manager, which position he held until June, 1926. During this period, he was also a special field assistant for the Kentucky Geological Survey under Willard R. Jillson, and in 1921 he worked on Kentucky clays with Heinrich Ries during a portion of the field season. Dr. Ries sponsored him as an Associate Member of The American Ceramic Society in 1922.

On June 1, 1926, Cecil became associated with The Ironton Fire Brick Company as Production Manager. He was made Vice-President in 1929, which position he still holds. In 1932, he was elected to the Board of Directors.

Cecil Eugene Bales

Activities in The American Ceramic Society

In 1922, Cecil became a member of the Program Committee of the Refractories Division and Chairman of the Committee in 1923. He was made Chairman of the Division in 1925 and elected as a Fellow in 1931. He served as Trustee of the Refractories Division from 1936 to 1939 and was Chairman of the Finance Committee during this period. He has also served on various special committees in The Society.

Membership in Other Technical Societies

Cecil is also a member of the Canadian Ceramic Society, a Director of the American Refractories Institute and

member of its Technical Advisory Committee, the American Society for Testing Materials (secretary of Committee C-8 on Refractories from 1932 to 1937), the Mineralogical Society of America, the Rocks and Minerals Association, the Institute of Ceramic Engineers, the American Foundrymen's Association (Vice-Chairman of the Refractories Committee), a member of the Joint Committee on Foundry Refractories, and the American Institute of Mining and Metallurgical Engineers.

He is also a member of the Ohio Ceramic Industries Association, having served as Chairman of its Public Relations Committee for several years and as President during 1940 and 1941.

Cecil is an honorary member of the North Carolina chapter of Keramos and is registered as a Professional Ceramic Engineer in Ohio and Kentucky.

Interested in civic affairs in Ironton, he has served as a Director of the Chamber of Commerce for a number of years and as a member of the City Council from 1930 to 1936. During this period, he served as Chairman of the Finance Committee. He is a member of the Ashland, Ky., Country Club and the Ironton Rotary Club, in which he served as Vice-President in 1930.

Publications

(1) "Effect of Impurities in Fire Clays," *Brick & Clay Record*, **59**, 723–25 (Nov. 15, 1921).

(2) "Refractory Cements and Protective Coatings," *Clayworker*, **78**, 140 (1922).

(3) "Fire-Clay Refractories," *Nat. Engr.*, July and August, 1922.

(4) "Manufacture and Properties of Refractories for Air Furnaces," *Trans. Amer. Foundrymen's Assn.* (1922).

(5) "Hand-Made Repressed Fire Brick," *Brick & Clay Record*, **69** [2] 125 (July 20, 1926).

(6) "Refractories for the Malleable Cast-Iron Foundry," *Amer. Refrac. Inst. Tech. Bull.*, No. 8, 5 pp. (Feb., 1927).

(7) "Segregation in Storage Bins," *ibid.*, No. 20 (Feb., 1928).

(8) "Manufacture of Dry-Press Brick by the Dry-Press Process," *Ohio Ceram. Ind. Assn. Bull.*, No. 5 (1928).

(9) "Refractories for the Cupola," *Trans. Amer. Foundrymen's Assn.*, **36**, 683–96 (1928).

(10) "Load Test for Refractories," *Blast Furnace Steel Plant*, **17** [2] 321 (1929).

(11) "Symposium on 'Variation in Size of Firebrick: Variation in Process of Manufacture,'" *Jour. Amer. Ceram. Soc.*, **14** [9] 688–90 (1931).

(12) "Economic Problems Confronting the Refractories Industry," *Brick & Clay Record*, **81** [1] 26–27 (1932).

(13) "Metal Wear in the Refractories Industry," *Amer. Refrac. Inst. Tech. Bull.*, No. 36 (March, 1933).

(14) "Refractories for Use in Cupolas," *ibid.*, No. 43, 7 pp. (Oct., 1933).

(15) "What Metal Wear Means to the Ceramic Industry," *Ceram. Age*, **21** [1] 8–9 (1933).

(16) "Refractories in Vertical Lime Kilns," *Amer. Refrac. Inst. Tech. Bull.*, No. 55, 6 pp. (Jan., 1935).

(17) (With W. T. Christian) "Firing Clay Refractories with By-Product Coke-Oven Gas," *Bull. Amer. Ceram. Soc.*, **14** [8] 245–50 (1935).

(18) "Care of Cupola Refractories," *Foundry*, **63** [1] 44, 48 (1935).

(19) "Symposium on Refractories Testing: Work of the American Society for Testing Materials on Refractories," *Bull. Amer. Ceram. Soc.*, **16** [8] 317–18 (1937).

(20) (With A. R. Blackburn) "Refractories for Foundry Ladles," *Trans. Amer. Foundrymen's Assn.*, **46** [1] 163–70 (1938).

(21) "Expanding Use of Superduty Fire-Clay Brick," *Ohio State Univ. Eng. Expt. Sta. News*, **12** [3] 15–16 (1940).

(22) (With A. R. Blackburn) "Refractories for Water-Gas Machines," *Gas Age*, **88** [4] 26–28, 33 (1941).

Vice-President, 1943–1944

Edwin Henry Fritz

Treasurer, 1943–1944

C. Forrest Tefft

Biographical sketches of Mr. Fritz and Mr. Tefft were published in *Bull. Amer. Ceram. Soc.*, **17** [3] 125–26 (1938) and **15** [1] 18 (1936), respectively.

ROGER LEE FELLOWS

Trustee for the Enamel Division, 1943–1946

Biography

Roger Lee Fellows was born in LaGrange, Ill., January 5, 1902. He attended grade and high schools in LaGrange. During the summers, while attending the University of Illinois, he obtained his first ceramic experience at the Coonley Manufacturing Company and Midland Terra Cotta Company of Cicero. In 1924, he received his B.S. degree in ceramic engineering from the University of Illinois.

Roger Lee Fellows

Immediately upon graduation, Mr. Fellows started working for the Chicago Vitreous Enamel Product Co., Cicero, Ill., in their mill room and smelting department. In his present capacity as Assistant Director of Research, he has been supervising the control, development, and research work in connection with the manufacture of porcelain enamel frits.

Mr. Fellows became a member of The American Ceramic Society in 1924 and has been a Fellow since 1941. He was Chairman of the Enamel Division in 1941–1942 and is the present Councillor for the Division. He is also a member of the Institute of Ceramic Engineers, Sigma Xi, Keramos, and the Chicago District Enamelers Club.

Publications

(1) "Enamel Symposium: IV, Emphasizing Control of Methods Used in Making and Firing Ground Coats for Sheet Steel," *Jour. Amer. Ceram. Soc.*, **10** [6] 56–59 (1927).

(2) "Economical Preparation and Use of Colored Enamels: I, Preparation," *Better Enameling*, **3** [10] 18–20, 25 (1932); "II, Use," *ibid.*, [11] 25–26.

(3) (With E. E. Howe) "Effect of Mill Additions on Thermal Expansion of Sheet-Iron Ground-Coat Enamels," *Jour. Amer. Ceram. Soc.*, **19** [4] 109–11 (1936).

(4) (With H. D. Chase) "Handling Small Parts in Large Quantities," *Better Enameling*, **7** [6] 8–11 (1936).

(5) (With E. E. Howe) "Effect of MnO, NiO, and CoO on Adherence and Reboiling Properties of a Ground-Coat Enamel," *Jour. Amer. Ceram. Soc.*, **20** [10] 319–24 (1937).

(6) (With L. A. Lange) "Use of Water Elutriator in Addition to Screen Tests in Determining Fineness Distribution of Milled Enamel," *ibid.*, **21** [9] 297–303 (1938).

(7) "Effects of Variables on Efficiency of Ball-Mill Operation," *Better Enameling*, **9** [2] 10–13 (1938).

(8) (With J. L. McLaughlin) "Milling and Its Effect on Properties of Porcelain Enamel Slips," *Jour. Amer. Ceram. Soc.*, **22** [8] 260–64 (1939).

(9) "Mill-Room Variations That Affect Grinding Efficiencies," *Better Enameling*, **10** [9] 9–12 (1939).

(10) "Presentation of 'Ball-Mill Wet Grinding of Porcelain Enamels,'" *Proc. Porc. Enamel Inst. Forum, Fourth Forum, Oct., 1939*, pp. 147–55.

(11) "Clays and Their Application to Modern Enameling Practice," *Proc. Porc. Enamel Inst. Forum, Sixth Forum, Oct., 1941*, pp. 106–11.

(12) (With P. M. Wheeler) "Relation of Coefficient of Expansion to Impact Resistance of Porcelain Enamels," *Jour. Amer. Ceram. Soc.*, **24** [11] 356–60 (1941).

CHARLES WILLIAM READ

Trustee for the Art Division, 1943–1946

Charles W. Read, vice-president and sales manager of the Shenango Pottery Co., New Castle, Pa., was born in Utica, N. Y., March 30, 1875. With his family, he moved to Syracuse, N. Y., in 1884, where he attended the Syracuse grade and high schools.

In 1892, Mr. Read became associated with the S. P. Pierce Sons in Syracuse. He later became associated with

Charles William Read

the Central New York Pottery Co., Chittenango, N. Y., and remained with them until the organization of the Iroquois China Co., Syracuse, N. Y.

Mr. Read joined the Shenango Pottery Company in March, 1913.

He has been a member of The American Ceramic Society since 1941.

JAMES BLISS AUSTIN

Trustee for the Refractories Division, 1943–1946

Biography

James Bliss Austin was born in Washington, D. C., July 16, 1904. He was graduated in 1925 from Lehigh University, Bethlehem, Pa., with the degree of chemical engineer and in 1928 he received a Ph.D. degree in chemistry from Yale University, New Haven, Conn. The same year, Dr. Austin became associated with the newly established Research Laboratory of the U. S. Steel Corp., Kearny, N. J. As physical chemist since 1929, he has been in charge of work on thermal conductivity and other properties of refractories and refractory insulators.

James Bliss Austin

Dr. Austin became a member of The American Ceramic Society in 1935 and a Fellow in 1940. Affiliated with the Refractories Division, he has served as Chairman of the Papers and Program Committee, 1937–1938; Secretary, 1938–1939; Vice-Chairman, 1939–1940; and Chairman, 1940–1941. At the present time, he is serving on the Publications Committee of The Society.

He is also a member of the American Chemical Society, the American Society for Metals (member of Publications Committee), the Optical Society of America, Phi Beta Kappa, Tau Beta Pi, Sigma Xi, Gamma Alpha, Alpha Chi Sigma, and Scabbard and Blade.

Publications

(1) "Equilibrium Pressure over Coexisting Salt Hydrates at Temperatures Below 0°," *Jour. Amer. Chem. Soc.*, **50,** 333–36 (1928).

(2) (With I. A. Black) "The Tesla-Luminescent Spectrum of Benzene," *Nature,* **125,** 274 (February 22, 1930).

(3) (With I. A. Black) "Emission Spectrum of Benzene in the Region 2500–3000 A.," *Phys. Rev.*, **35,** 452–60 (1930).

(4) "Relation Between Molecular Weights and Melting Points of Organic Compounds," *Jour. Amer. Chem. Soc.*, **52,** 1049–53 (1930).

(5) "Raman Effect in Liquefied Gases," *Nature,* **125,** 464 (March 22, 1930).

(6) "Decomposition of Hydrocarbons in the Electrodeless Discharge," *Jour. Amer. Chem. Soc.*, **52,** 3026–27 (1930).

(7) (With I. A. Black) "Chemical Behavior of Some Benzenoid Hydrocarbons in the Tesla Discharge," *ibid.*, pp. 4552–57.

(8) (With I. A. Black) "Emission Spectra of Some Simple Benzene Derivatives," *ibid.*, pp. 4755–61.

(9) "Temperature Distribution in Solid Bodies During Heating or Cooling," *Physics*, **1,** 75–81 (1931).

(10) "Thermal Expansion of Some Refractory Oxides," *Jour. Amer. Ceram. Soc.*, **14** [11] 795–810 (1931).

(11) "Calculation of Characteristic Frequency from the Coefficient of Compressibility," *Phys. Rev.*, **38,** 1788–90 (1931).

(12) "Heat Capacities of Some Hydrogen Halides at High Temperatures as Calculated from Raman Spectra," *Jour. Amer. Chem. Soc.*, **54,** 3459–60 (1932).

(13) "Temperature Distribution in Solid Bodies During Heating or Cooling, a Correction," *Physics*, **3,** 179–84 (1932).

(14) "Heat Capacity of Iron, a Review," *Ind. Eng. Chem.*, **24,** 1225–35 (1932).

(15) "Entropy, Heat Content, and Free Energy of Iron," *ibid.*, pp. 1388–91.

(16) "Vacuum Apparatus for Measuring Thermal Expansion at Elevated Temperatures, with Measurements on Platinum, Gold, Magnesium, and Zinc," *Physics*, **3,** 240–67 (1932).

(17) (With R. H. H. Pierce, Jr.) "Constitution and Thermal Expansion of Silica Coke-Oven Brick After Service," *Jour. Amer. Ceram. Soc.*, **16** [2] 102–106 (1933).

(18) (With R. H. H. Pierce, Jr.) "Linear Thermal Expansion of a Single Crystal of Sodium Nitrate," *Jour. Amer. Chem. Soc.*, **55,** 661–68 (1933).

(19) "Thermodynamic Study of the Iron-Carbon Diagram; an Extended Abstract of a Paper by Körber and Oelsen," *Metals & Alloys*, **4,** 49–53 (1933).

(20) (With R. H. H. Pierce, Jr.) "Thermal Expansion of Heat-Resisting Iron Alloys," *Ind. Eng. Chem.*, **25,** 776–79 (1933).

(21) (With R. H. H. Pierce, Jr.) "Linear Thermal Expansion and Alpha-Gamma Transformation Temperature of Pure Iron," *Physics*, **4,** 409–10 (1933).

(22) (With R. H. H. Pierce, Jr.) "Linear Thermal Expansion and Alpha-Gamma Transformation Temperature of Pure Iron," *Trans. Amer. Soc. Steel Treating*, **22,** 447–68 (1934).

(23) (With R. H. H. Pierce, Jr.) "Linear Thermal Expansion and Transformation Phenomena of Some Low-Carbon Iron-Chromium Alloys," *Trans. Amer. Inst. Mining Met. Engrs.*, **116,** 289–307 (1935).

(24) "Dependence of Rate of Transformation of Austenite on Temperature," *ibid.*, pp. 309–18.

(25) (With R. H. H. Pierce, Jr.) "Determination of Refractive Index of Vitreous Silica and Calibration of Silica Refraction Thermometers Between 18° and −200°C.," *Physics*, **6** [1] 43–46 (1935).

(26) (With R. B. Sosman) "Apparatus for Measuring the Magnetic Susceptibility of Liquids and Solids at High Temperatures, "*Jour. Wash. Acad. Sci.*, **25,** 15–32 (1935).

(27) (With R. H. H. Pierce, Jr.) "Reliability of Measurements of Thermal Conductivity of Refractory Brick," *Jour. Amer. Ceram. Soc.*, **18** [2] 48–54 (1935).

(28) (With R. H. H. Pierce, Jr) "Linear Thermal Expansion of Sodium Tungstate Between 20° and 600°," *Jour. Chem. Phys.*, **3,** 683–86 (1935).

(29) "Physics and Chemistry of Firing Ceramic Ware," *Bull. Amer. Ceram. Soc.*, **14** [5] 157–65 (1935).

(30) "Useful Integrated Form of Equation for Calculating Change of Equilibrium with Temperature," *Jour. Amer. Chem. Soc.*, **57** [12] 2428–34 (1935).

(31) "Use of Penetrating Radiations in Measurement of the Porosity of Refractory Brick," *Jour. Amer. Ceram. Soc.*, **19** [2] 29–36 (1936).

(32) (With R. H. H. Pierce, Jr.) "Comparison of the Thermal Expansion of Used Silica Brick from an Insulated and an Uninsulated Open-Hearth Furnace Roof," *ibid.*, [10] 276–81.

(33) (With R. H. H. Pierce, Jr., and W. O. Lundberg) "Comparison of Thermal Conductivity and Thermal Expansion of Coke-Oven Liners Made from Eastern and Western Quartzite," *ibid.*, **20** [11] 363–67 (1937).

(34) "Linear Thermal Expansion of 'Beta-Alumina,'" *ibid.*, **21** [10] 351–53 (1938).

(35) (With M. H. Armbruster) "Adsorption of Gases on Plane Surfaces of Mica," *Jour. Amer. Chem. Soc.*, **60,** 467–75 (1938).

(36) "Efficiency of the Blast-Furnace Process," *Trans. Amer. Inst. Mining Met. Engrs.*, **131,** 74–99 (1938); also *Iron Steel Engr.*, **16,** 31 (1939).

(37) (With R. L. Rickett) "Kinetics of Decomposition of Austenite at Constant Temperature," *Trans. Amer. Inst. Mining Met. Engrs.*, **135,** 396–416 (1939).

(38) (With M. H. Armbruster) "Adsorption of Ethyl Iodide on a Plane Surface of Iron at 20°," *Jour. Amer. Chem. Soc.*, **61,** 1117–23 (1939).

(39) "Methods of Representing Distribution of Particle Size," *Ind. Eng. Chem., Anal. Ed.*, **11** [6] 334–39 (1939).

(40) "Insulation," *Metal Progress*, **36** [4] 501–502 (1939).

(41) "Factors Influencing Thermal Conductivity of Nonmetallic Materials," *A.S.T.M. Symposium on Thermal Insulating Materials*, 1939, pp. 3–69.

(42) (With M. J. Day) "Heat Etching as Means of Revealing Austenite Grain Size," *Trans. Amer. Soc. Metals*, **28,** 354–70 (1940).

(43) (With D. S. Miller) "Magnetic Permeability of Some Austenitic Iron-Chromium-Nickel Alloys as Influenced by Heat-Treatment and Cold Work," *ibid.*, pp. 743–55.

(44) (With R. H. H. Pierce, Jr., H. Saini, and J. Weigle) "Direct Comparison on a Crystal of Calcite of the X-Ray and Optical Interferometer Methods of Determining Linear Thermal Expansion—Review of Equilibrium Data," *Phys. Rev.*, **57,** 931–33 (1940).

(45) (With M. J. Day) "Chemical Equilibrium and Control of Furnace Atmospheres," *Ind. Eng. Chem.*, **33** [1] 23–31 (1941).

(46) "Equation Representing Rate of Development of Rust on Galvanized Iron Sheets as Estimated by A.S.T.M. Test," *Proc. Amer. Soc. Testing Materials*, **41,** 766–75 (1941).

(47) (With M. J. Day) "Chemical Equilibrium as Guide in Control of Furnace Atmospheres," *A.S.T.M. Symposium on Controlled Atmospheres*, 1942, pp. 20–56.

(48) Flow of Heat in Metals. A series of five Educational Lectures presented at the National Metals Congress in 1941. Published by American Society for Metals, Cleveland, Ohio, 1942.

NEW MEMBERS IN MARCH

Corporation

* AMERICAN EMERY WHEEL WORKS, Harold O. Skoog (voter), 1 Richmond Square, Providence, R. I.

* Indicates former member of The Society rejoining.

Personal

CAHOON, G. J., 2534 Linden Ave., Knoxville, Tenn.; assistant to the president, Knox Porcelain Corp.

COLEMAN, THOMAS B., 523 Beal St., Rocky Mount, N. C.; manager, Nash Brick Co.

NORDYKE, JOHN S., 714 Shady Drive, East, Pittsburgh (16), Pa.; Pittsburgh Branch manager, Eagle-Picher Lead Co.

SORKIN, JACOB, 1181 Randall Ave., Bronx, N. Y.; treasurer and secretary, Acme Porcelain Enameling Corp.

Student

Rutgers University: JOSEPH C. B. FREIMAN.

University of Texas: CARL M. FURGASON, ARTHUR M. PATUREAU, AND PAUL B. STEWART.

MEMBERSHIP WORKERS' RECORD

Corporation

Office			1

Personal

L. R. Whitaker	1	Office	3

Student

E. P. McNamara	1	F. K. Pence	3
		Grand Total	**9**

ROSTER CHANGES FOR MARCH*

Personal

BAILEY, JOHN A., JR., 0–390252, 5th Engrs., A.P.O. 860, c/o Postmaster, New York, N. Y. (Sedley, Va.)

BARR, JAMES A., JR., Mulberry, Fla. (Spruce Pine, N. C.)

CHURCH, MARSHALL T., 1978 Guilford Rd., Columbus, Ohio (Norfolk, Va.)

CLAPHAM, CHARLES H., JR., Westinghouse Electric & Mfg. Co., Fairmont, W. Va. (Philadelphia, Pa.)

DAVIES, CHESTER A., 18 Loomis St., Montpelier, Vt. (Titusville, N. J.)

GAMBLE, ENS. ELTON S., Rm. A4–17, Sage Hall, Cornell University, Ithaca, N. Y. (New York, N. Y.)

KNAPP, ENS. WILLIAM J., 15 Blake St., Belmont, Mass. (Catskill, N. Y.)

PIERCE, J. ALLEN, 2612 Liberty Parkway, Dundalk, Md. (Columbus, Ohio)

PLOETZ, EDWIN C. H., Bloomer, Wis. (Camp Davis, N. C.)

SANTOMIERI, S. LEWIS, 6733 Eastern Ave., Takoma Park, Md. (Washington, D. C.)

SHATTUCK, LUCILLE, Room 636, Mills Bldg., San Francisco, Calif. (San Mateo, Calif.)

WEIS, J. H., Solvay Process Co., Kings Mountain, N. C. (Lenoir, N. C.)

WHITE, R. H., Alden Park Manor, Germantown, Philadelphia, Pa. (Arvida, Quebec, Canada)

WILLMORE, TRACY A., JR., 507 W. South St., Clinton, Ill. (Gary, Ind.)

* Address in parentheses is former address.

AN ASSOCIATE SECRETARY WANTED

The Board of Trustees has approved the employment of an Associate Secretary for The Society. His duties will be to act as an understudy to Ross C. Purdy, to promote increased interest in the Local Sections and Student Branches, and to supplement the other activities now being performed by the General Secretary. A salary will be paid commensurate with the experience and ability of the applicant.

Applications for this position are now being received at the offices of The American Ceramic Society, 2525 North High Street, Columbus, Ohio.

—C. E. BALES, *Chairman,*
Special Committee on Associate Secretary

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Where and When Competition Controls

COMMUNITY ENTERPRISE

Where and When Community Interest Is Involved
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Where and When Monopoly Is Expedient
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A Mutual Law-Making and Inforcing Federation
With Bill of Rights Guaranteeing Free Enterprises

Individuals Invest in Community and Controlled Enterprises
As in Business Corporations
Because in Unity There Is Personal Profit
Without Abridgment of Free Enterprise

To Enjoy Free Enterprise One Must Be Enterprising
In a Federation of Rugged Individuals

For Ceramists a Membership in

THE AMERICAN CERAMIC SOCIETY, INC.

PAID MEMBERSHIP AND SUBSCRIPTION RECORD

Date of Record	Members Paid		Deferred	Subscriptions	Monthly Sales	Total Circulation
	Personal	Corporation				
December 19, 1939	1876	237	27	642	220	3002
December 20, 1940	1995	260	25	574	220	3074
December 21, 1941	2029	257	37	609	220	3152
December 21, 1942	2088	270	15	446	220	3039
January 21, 1943	2079	267	11	444	220	3021
February 21, 1943	2095	267	10	451	220	3043
March 21, 1943	1765	262	8	416	220	2671

INSTITUTE OF CERAMIC ENGINEERS

Executive Committee, 1942–1943

President: H. M. KRANER, Bethlehem Steel Co., Bethlehem, Pa.
Vice-President: H. B. DUBOIS, Consolidated Feldspar Corp., Trenton, N. J.
Secretary: H. G. SCHURECHT, New York State College of Ceramics, Alfred, N. Y.
Past-President: E. H. FRITZ, Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.
Trustee Representative: H. G. WOLFRAM, Porcelain Enamel & Mfg. Co., Baltimore, Md.

NOMINATIONS FOR 1943–1944

President: H. B. DUBOIS, Consolidated Feldspar Corp., Trenton, N. J.

*Vice-President**

ROBERT F. SHERWOOD, United Feldspar & Minerals Corp., 10 East 40th St., New York, N. Y.
FRED L. STEINHOFF, Industrial Publications, Inc., 59 E. Van Buren St., Chicago, Ill.

*Secretary**

KARL SCHWARTZWALDER, A C Spark Plug Co., Flint, Mich.
W. L. FABIANIC, Owens-Illinois Glass Co., Alton, Ill.

* One to be elected.

DEMAND AND SUPPLY OF CERAMIC ENGINEERING GRADUATES

Report of Subcommittee D of General Committee on Status of Ceramic Engineers with the Selective Service Boards, American Ceramic Society

This Subcommittee was assigned the task of deferment of ceramic engineering students. To have a basis for appealing to draft boards, we undertook to ascertain the demand for ceramic engineers in essential industries. Two surveys were made, viz., one covering the period January 1 to September 30, 1942, and one covering the period October 1 to December 31, 1942.

To obtain this data, we solicited information on the calls for men received by each ceramic school, the industry concerned, and whether the demand was supplied. This information was edited, and duplications were eliminated.

The first survey disclosed calls for 202 men of which 53 were supplied, leaving a deficit of 149 men. Of these calls, 190 were from industries which, according to our best advice from the Manpower Commission, were essential to the war effort. Fifty-two of these calls were supplied, leaving a deficit of 138 men in essential industries.

The second survey disclosed 49 calls for men from essential industries of which 9 were supplied from nonessential industries and 3 from recent graduates, leaving a deficit of 37 men called for in the last quarter of 1942.

Thus we have a deficiency of 175 trained ceramic engineers in essential ceramic industries as of January 1, 1943.

The results of these surveys have been sent to industries making requests for men so far as the names were disclosed by the surveys. The reports were also published in *The Bulletin of The American Ceramic Society* (see January and March, 1943, *Bulletins*, pp. 16 and 71, respectively) and furnished to the other ceramic publications.

This Subcommittee was also active in promoting the issue of Occupational Bulletin No. 34 of October 23, 1942, certifying to all draft boards that the production of stone, clay, and glass products is an activity essential to the support of the war effort (see January, 1943, *Bulletin*, p. 15).

We have not to date succeeded in having the ceramic engineering curriculum certified as essential training, and due to the small student enrollment we are not hopeful in this matter. Ceramic engineering is recognized, however, by all engineering colleges having such departments, and the ceramic engineering students enjoy the same deferment considerations as other engineering students based on satisfactory class records.

In the organization of the Army Specialized Training Program, no students will be assigned to training in curricula other than civil engineering, chemical engineering, electrical engineering, and mechanical engineering. All engineering students, including ceramic engineers, will be eligible, however, to assignment to colleges for further engineering training if they have satisfactorily completed elementary engineering courses.

Whether students now engaged in ceramic engineering training will be permitted to continue their education under the Liberalized Plan just announced (see February, 1943, *Bulletin*, p. 52) will be in the hands of the individual draft boards. It is therefore important that each school provide its undergraduate ceramic engineering students with material indicating the importance of ceramic engineering training in the maintenance of the essential ceramic industries. To this end, we recommend that The American Ceramic Society immediately prepare and make available to the various schools training students in ceramic engineering a carefully prepared statement of this nature. We feel that such a statement from a national society will be of greater aid to the individual students in dealing with their draft boards than material prepared by the individual schools.

Respectfully submitted,
M. E. HOLMES, J. W. WHITTEMORE, AND A. S. WATTS, *Chairman*

March 9, 1943

LETTER TO EDITOR

Civilian Public Service,
Camp 37,
Coleville, Calif.,
February 25, 1943

Dear Mr. Purdy:

I am writing this information to you in case you may sometime find use for it.

The two factors involved are (1) the probability that in the ceramic industry or in the universities having ceramic engineering departments there are vacancies, due to the drafting of men, where ceramic research was being carried on—research that is normally important and probably still relatively important in this war time; (2) the fact that in certain cases I might be available to fill some one of these vacancies.

My position is this: I have been registered in the draft and classsed IVE, which means that group of persons who are doing alternative service to military. There are a fair number of men in the draft who have been generally opposed to the war and who are in these Civilian Public Service camps which have been organized and administered by the Peace churches for carrying out "work of national importance" as provided by the Selective Service Act for such government agencies as the Department of the Interior and the Forest Service.

Selective Service has seen fit in instances where the validity of the work allows to let men work away from these camps on what is called Detached Service. In such cases, men released thus remain under the jurisdiction, in part, of the Selective Service System. They retain their classification of IVE and are not considered out of the draft.

In reality, CPS men on Detached Service live away from these camps and do work under civilian status but report regularly on their progress to the Selective Service System.

The same financial status as in the camps is retained, which means that the person or agency employing a CPS

assignee for Detached Service need only provide the maintenance the assignee is accustomed to, in other words, maintenance including board, room, work clothes, similar compensation that the employer carries for employees (if any), and a spending allowance of $2.50 per month.

It all boils down to this: If you know of any research positions needing filling, where the employer (university, individual, or corporation), understanding my status, would agree to employ me under the outlined conditions, it might be possible that through Selective Service I could be obtained for such work.

Would you keep me in mind, and, if anything turns up where this information may prove of value, would you let me know?

Sincerely yours,
HAROLD E. RIEGGER

Mr. Riegger was formerly instructor in the Ceramic Department of the Philadelphia Museum School of Industrial Art, Philadelphia, Pa.

ANNUAL MEETING OF THE FELLOWS

The annual meeting of the Fellows will be held at 2:30 P.M. on Sunday, April 18. ROBERT B. SOSMAN, Dean of the Fellows, will preside, and R. M. KING will be present as Secretary. The meeting will be followed by a dinner at which Professor NORMAN L. BOWEN, Orton Lecturer, will be guest of honor.

Program

Minutes of the preceding annual meeting.
Report of the Dean.
Report of the Secretary-Treasurer on Fellowship finances.
Report of the Committee on Honorary Membership (ALEXANDER SILVERMAN, L. E. BARRINGER, G. A. BOLE, M. E. HOLMES).
Report of the Committee on History of Ceramic Education (S. R. SCHOLES, A. I. ANDREWS, A. V. BLEININGER, E. C. HENRY, R. C. PURDY, and HEWITT WILSON).
Report of the Committee on Fellowship Rules (D. E. SHARP, R. D. LANDRUM, and W. K. MCAFEE).

Consideration of proposals for changes in Fellowship organization: Some fundamental changes have been under discussion by the Committee on Rules and should be fully considered before being put into the form of amendments to the Constitution, By-Laws, and Rules of The Society.

By authorization of the Board of Trustees, the Fellows will receive and discuss reports from the technical committees of The Society and from The Society's representatives in other organizations.

The technical committees to be heard from include Committee on Research, ARTHUR A. WELLS, *Chairman;* Committee on Geological Surveys, H. RIES, *Chairman;* Committee on Data, F. P. HALL, *Chairman;* Committee on Industrial Management, W. KEITH MCAFEE, *Chairman;* Committee on Patents, F. B. FLICK, *Chairman;* Committee on Dust Hazard, F. C. FLINT, *Chairman;* and Committee on Standards, J. W. WHITTEMORE, *Chairman.*

The Society has representatives in several American organizations, as follows:

American Association for the Advancement of Science, R. C. PURDY.
American Foundrymen's Association, L. C. HEWITT.
American Society for Testing Materials: Committee A-1 on Steel, H. F. STALEY; Committee C-4 on Clay Pipe, C. M. DODD; Committee C-5 on Fire Tests of Materials and Construction, E. J. LEWIS; Committee C-6 on Drain Tile, J. L. CHILD; Committee C-7 on Lime, C. R. AUSTIN; Committee C-8 on Refractories, J. W. WHITTEMORE; Committee C-11 on Gypsum (Society not now represented); Committee C-14 on Glass and Glass Products, G. W. MOREY; Committee C-15 on Manufactured Masonry Units, FREDERICK HEATH, JR.; Committee D-3 on Gaseous Fuels, C. H. PARMELEE; Committee D-5 on Coal and Coke, A. W. GAUGER; and Committee D-9 on Electrical Insulating Materials, L. E. BARRINGER.
American Society of Mechanical Engineers: Petroleum Division, H. R. STRAIGHT; and Process Division, W. KEITH MCAFEE.
American Standards Association: Project A-6, Drain Tile, J. L. CHILD; Project A-40, Plumbing, H. WHITTAKER; Project A-41, Brick Masonry, J. W. WHITTEMORE; Project A-62, Dimensions of Building Materials, FREDERICK HEATH, JR.; Project C-29, Power-Line Insulators, G. W. LAPP; Project M-20, discontinued, 1940; Project Z-10, Symbols and Abbreviations, RALSTON RUSSELL, JR.; Project Z-23, Testing Sieves, A. S. WATTS; and Project Z-26, Safety Glass, GEORGE WATKINS and D. E. SHARP.
Illuminating Society and Luminous Glassware Guild: W. C. TAYLOR, Chairman of American Ceramic Society delegation.
Inter-Society Color Council: I. A. BALINKIN, Chairman of American Ceramic Society delegation.
National Research Council: Division of Chemistry and Chemical Technology, G. W. MOREY; and *Division of Geology and Geography,* G. W. MOREY.
U. S. Department of Commerce, Division of Simplified Practice, Permanent Committee on Simplification of Variety and Standards of Vitrified Paving Brick, C. C. BLAIR.

Representatives in international organizations include *International Association for Testing Materials,* S. M. PHELPS; *International Commission on Glass Technology,* J. C. HOSTETTER; and *International Chemical Congress,* ALEXANDER SILVERMAN.

As far as available time permits, these representatives of The Society in national and international organizations will be asked to state briefly the character of the activity, whether or not the representation should be continued, and whether there are other similar activities in which we might be profitably represented. Any recommendations will be immediately transmitted to the Board of Trustees.

At the close of the meeting, the report of the scrutineers of ballots for election of officers will be received and announced.

A Ceramic Book List

The advice and help of the Fellows in improving the classification given on p. 121, especially in their own fields, will be appreciated.

The project of a Ceramic Book List, begun several years ago, has been turned over to the Fellows of The American Ceramic Society for completion. A list of 2084 titles exists, but needs paring in some places, amplifying in others. Particularly it needs classification in order that the user, who in most instances will be a person unfamiliar with the subject on which he is seeking information, will be quickly led to the books that will be most useful to him. This means grouping the books into units of 5 or 10, and preferably never over 20, titles. There will be books under the general title as well as under the subtitles.

This list is not intended to be a bibliography of the subject. The material at hand consists rather of the books that would be likely to be found in a technical library or in the technologic branch of a large public library. Journal articles are not included. Of governmental and institutional bulletins, it is proposed to include only those of broader scope than a technical article and the kind that would be indexed and shelved as individual books in a small library.

This classification of subjects is not intended to be logical but rather to be a librarian's classification, with the purpose of making the information most easily accessible. It will probably be desirable to cross reference liberally, and a compact index may also have to be added.

An active committee will be appointed as the project develops, and the Fellows will be asked later to criticize individually some of the groupings for the final list as assembled by the committee.

—ROBERT B. SOSMAN, *Dean of the Fellows*

Classification of Subjects

GENERAL WORKS: In English and in foreign languages.
BIBLIOGRAPHIES.
GENERAL PERIODICALS (?).
CERAMIC ART: Prehistoric; clay, enameled, and glass products (ancient and modern).
ABRASIVES: Manufacture and use.
CEMENTS: Portland cement and other cements made by ceramic processes.
VITREOUS ENAMELS (see also CERAMIC ART): Manufacture; application; metallography and metallurgy in relation to enamels.
GLASS (see also CERAMIC ART): Manufacture; use; optical glass; chemical glass; vitreous silica (fused quartz); other special glasses; glass blowing.
LIME.
STRUCTURAL CLAY PRODUCTS (see also REFRACTORIES): Brick, paving brick; tile; terra cotta.
REFRACTORIES: Manufacture; use; steelmaking refractories; refractory thermal insulators.
WHITEWARE (see also CERAMIC ART): Manufacture; stoneware; dinnerware; electrical porcelain.
CERAMIC RAW MATERIALS (see also CERAMIC CHEMISTRY AND PHYSICS): Clays, sources; geology and mineralogy of raw materials; fuels; quarrying and mining of ceramic materials.
CERAMIC PROCESSES AND EQUIPMENT: Crushing, grinding, and forming machinery; kilns; furnaces, electric furnaces (see also ABRASIVES); combustion and heat transfer; pyrometry and control.
CERAMIC SCIENCE: Ceramic chemistry, analytical, and chemistry of dispersed systems; ceramic physics, plasticity.
CERAMIC EDUCATION.
CERAMIC ECONOMICS: Ceramic patents (general works) and industrial management of ceramic plants; ceramic industrial hygiene.
HISTORY OF CERAMICS: History of ceramic art and of industry.

NECROLOGY

ELMER HOLMES VAN SCHOICK, SR.

Word has been received of the sudden death by asphyxiation of Elmer Holmes Van Schoick, Sr., president of the Chicago Retort & Fire Brick Co., Ottawa, Ill., and his older son, E. H. Van Schoick, Jr., at their home in Ottawa, Ill., March 12, 1943. This news comes as a great shock to his many friends in The American Ceramic Society.

Biography

Mr. Van Schoick was born June 14, 1889, in Bloomington, Ill. He first became associated with the Chicago Retort & Fire Brick Company at Ottawa, Ill., following his graduation from the Department of Ceramic Engineering at the University of Illinois, Urbana, Ill., in 1911. In December, 1917, he enlisted in the United States Army with the 30th Engineers (Gas and Flame Regiment) and was sent overseas immediately, where he served in five major engagements with his regiment. In the spring of 1919, he returned to his work at the Chicago Retort & Fire Brick Company, and in 1935, he became president of the Company following the death of Charles S. Reed.

Elmer H., Jr. (Vannie), was born August 2, 1926, and was in his junior year in high school.

Mr. Van Schoick is survived by his widow, Ruth McElhiney Van Schoick, and a son, George Samuel Van Schoick, aged 9. He was the brother of Emily C. Van Schoick, Assistant Editor of The American Ceramic Society publications.

Society Affiliations

Mr. Van Schoick became a member of The American Ceramic Society in 1913 and a Fellow in 1933. Affiliated with the Refractories Division, he was successively Vice-Chairman of the Division (1922–1923); Chairman, Committee on Rules (1922–1923); member, Committee on Papers and Program (1921–1922); member, Membership Committee (1923–1924); Secretary (1927–1928); Chairman, Committee on Papers and Program (1926–1927); Chairman (1929–1930); member, Nominating Committee (1932–1933); and member, Standards Committee (1933–1934). He also served as a member of the Nominating Committee (1941–1942) of The Society.

He was also a member of the American Refractories Institute, and he served as a member of the Technical Advisory Committee (since 1930); Nominating Committee (1930); and Rules Committee (1931–1932); and a member of Committee C-8 on Refractories of the American Society for Testing Materials.

Elmer Holmes Van Schoick, Sr.

Publications

(1) Discussion on "Causes of Bulges on Struck-Off Fire-Clay Shapes," *Bull. Amer. Ceram. Soc.*, **2** [5] 119–21 (1923).

(2) Discussion on "Burning Refractories with Special Reference to Control of Labor Costs," *ibid.*, [9] 305–306.

(3) Discussion on "Cupola Brick," *ibid.*, **3** [3] 91–92 (1924).

(4) "Design of Fire-Clay Shapes," *Amer. Refrac. Inst. Bull.*, No. 16 (Oct., 1927).

(5) "Daily Plant Log for Efficient Production Control," *Brick & Clay Record*, **72** [13] 908–10 (1928); also in *Ceram. Ind.*, **11** [1] 62–64 (1928).

(6) Symposium on "Variation in Size of Fire Brick: (*C*) Causes of Variation in Size and Shape of Fire-Clay Brick; (1) Variation in Shrinkage of Clay," *Jour. Amer. Ceram. Soc.*, **14** [9] 682–84 (1931).

(7) "Outline of Manufacture and Properties of Stiff-Mud Fire Brick," *Amer. Refrac. Inst. Tech. Bull.*, No. 45, 8 pp., 4 figs. (1933).

Patent

(1) "Fire Brick and Method of Making," U. S. Pat. 2,219,606, Oct. 29, 1940.

GEORGE DUNCAN HEISEY

George Duncan Heisey, a former associate of the A. H. Heisey & Co., Newark, Ohio, died February 19, 1943, at his home in Newark. He had been seriously ill for two months of a heart ailment.

Mr. Heisey was the son of the late Major Augustus H. and Susan Duncan Heisey. His boyhood was spent in Idlewood, Pa., and he took preparatory college work at Park Institute, Pittsburgh, Pa., and at the Western University of Pennsylvania, and was graduated from Lehigh University, South Bethlehem, Pa., in 1897, as a mining engineer.

As an undergraduate, he was active in campus activities and athletics and was a former halfback on the Lehigh football team. He was also editor of the college paper, *Brown and White*, and a member of Psi Upsilon fraternity.

After completing his college work, Mr. Heisey became associated with his father in the manufacture of table glass. He pioneered in the revival of colonial glassware during the early years of the Company, which had located in Newark in 1893.

Becoming interested in politics, Mr. Heisey retired from active business. During his political career, he enjoyed the friendship and confidence of William Howard Taft and Senator Joseph B. Foraker. President Taft tendered Mr. Heisey the position of Assistant Secretary of the Treasury, but he was forced to decline owing to the serious illness of his mother at the time. For a number of years, Mr. Heisey served as chairman of the State Republican Executive Committee.

All of his life, Mr. Heisey was fond of blooded horses and cattle and as a breeder of pure-bred animals he made outstanding contributions in raising the standards of the domestic stock of the county in which he lived. He was also actively connected with the Farm Bureau for many years.

Mr. Heisey is survived by two sisters and one brother, T. Clarence Heisey of Newark.

LOCAL SECTIONS

CHICAGO SECTION

Officers for 1943

President: HUGO FILIPPI, Illinois Brick Co., Chicago Ill.

Vice-President: R. K. HURSH, Dept. of Ceramic Engineering, University of Illinois, Urbana, Ill.

Secretary-Treasurer: J. J. SVEC, Industrial Publications, Inc., Chicago, Ill.

PITTSBURGH SECTION

The regular monthly meeting of the Pittsburgh Section was held at Mellon Institute on March 9, 1943.

A change of program from the usual technical subjects proved to be highly interesting as Arthur A. Wells, Vice-President, Homer Laughlin China Co., Newell, W. Va., related some of his experiences with labor relations in the pottery industry. The relations of pottery unions and management have been amicably negotiated for over forty years and serve as a model that other industries could well afford to copy. The freedom from strikes and losses due to labor disagreements has proved to be very helpful to both the pottery workers and management. Many questions on the subject were answered by Mr. Wells.

Chairman E. E. Marbaker pointed out that there would be no meeting in April and that the Annual Meeting of The Society would be held in Pittsburgh, April 18 to 21. The general plans of program and entertainment were outlined. It was also announced that a dinner meeting, to which the ladies would be invited, was planned for the month of May.

—H. E. SIMPSON, *Secretary*

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CERAMIC SCHOOL NOTES

NEW YORK STATE COLLEGE OF CERAMICS

After thorough investigation, the Engineer's Council for Professional Development has approved the unlimited and unqualified accrediting of the New York State College of Ceramics, Alfred, N. Y., for the training of professional ceramic engineers.

The committee conducting the investigation consisted of Dean Moreland, Massachusetts Institute of Technology, Cambridge, Mass., Dean Hammond, Pennsylvania State College, State College, Pa., Dean Holbrook, University of Pittsburgh, Pittsburgh, Pa., and a number of representatives from the ceramic industry.

Improvements in only two courses were recommended by the committee after examining every phase in the operation of the College, including the administration, finances, curricula, texts, methods of teaching, laboratory procedures, and tests and examinations.

A reinspection after the recommended improvements were made resulted in the accrediting of the College for the training of students in ceramic engineering.

PERSONAL ITEMS

C. W. PARMELEE, FELLOW, SOCIETY OF GLASS TECHNOLOGY*

"It is with great pleasure that I inform you that on the unanimous recommendation of the Board of Fellows the Council at its meeting on Wednesday, February 17, unanimously resolved that in recognition of your special service to glass technology you be elected a Fellow under Rule 18 and that your subscription be remitted.

"It is part of our duty and privilege to look round on the world of glass technology and to take note of those who, by creative effort, have been and are assisting in the development of this subject. We feel that what you have done in the Department of Ceramic Engineering, especially within the past fifteen years, to stimulate research activities and to broaden the interest of glass manufacturers in glass technological problems has constituted a noteworthy contribution."

* A letter from W. E. S. Turner, Secretary of the Society of Glass Technology, to. C. W. Parmelee, professor emeritus, Department of Ceramic Engineering, Univ. of Illinois, Urbana, Ill.

DR. J. W. G. HANNON

Lecturer on Silicosis

Refractories Division, Tuesday Afternoon*

Dr. J. W. G. Hannon

* See the Annual Meeting Program, this issue, p. 98.

NOTES FOR CERAMISTS

BAUSCH & LOMB AT WAR

With the award of a third star by the Army-Navy Board of Production Awards for outstanding performance, the Bausch & Lomb Optical Company, Rochester, N. Y., has issued a new booklet entitled Bausch & Lomb at War, which gives some of the record on which the awards were based.

The booklet tells how Bausch & Lomb anticipated many of the demands made upon it; how it doubled, tripled, and in some departments quadrupled its forces and increased its shifts to two and three a day; how it leased, rented, constructed, and purchased property outright to provide for its army of workers and equipment.

Some of the scores of optical instruments being delivered to the armed forces are shown in sixty illustrations, e.g., height finders, range finders, battery commander's telescopes, binoculars, searchlight mirrors, stereoscopic trainers, photographic lenses, mapping equipment, gun sights, aviator's goggles, spotting scopes, aerial navigation sextants, mobile optical shops for field service, and microscopes and refraction equipment for the medical services.

The booklet is a case history of one of the country's most important industries at war—the fourth war in which this ninety-year old Company has actively participated.

(1943)

NEW COMPANY ORGANIZED

The Dow Chemical Co., Midland, Mich., and the Corning Glass Works, Corning, N. Y., have announced the incorporation of a new company to be known as the Dow Corning Corporation and to be equally owned by the two parent companies.

The new company has been organized to manufacture and sell silicon resinous materials and is the result of a number of years of research on the part of both companies. The formation of the new company will greatly accelerate the development and production of these newly developed materials.

The company is incorporated in the State of Michigan and will manufacture its products in Midland.

The directors of the new corporation are E. C. Britton, Director of Organic Research, Dow Chemical Company; W. R. Collings, Production Manager, Cellulose Products Division, Dow Chemical Company; W. H. Dow, President, Dow Chemical Company; W. R. Veazey, Director, Dow Chemical Company; Glen W. Cole, President, Corning Glass Works; Amory Houghton, Chairman of the Board, Corning Glass Works; E. W. Ritter, Manager of Manufacturing and Engineering, Corning Glass Works; and E. C. Sullivan, Vice-Chairman of the Board and Director of Research, Corning Glass Works.

The officers are E. C. Sullivan, *President;* W. R. Collings, *Vice-President and General Manager;* E. C. Britton, *Secretary;* and C. D. LaFollette, *Treasurer.*

CORNING MULTIFORM INSULATORS

The Corning Glass Works, Corning, N. Y., has announced the development of a new type of electrical insulation known as Multiform Insulators. This new manufacturing process has "kicked out the window" many production barriers that have faced the glass industry throughout its long history. Conventional glassmaking methods —blowing, pressing, and drawing—have produced, to be sure, a multiplicity of glassware. The Corning Glass Works alone produces approximately 37,000 items. But the glassware made by these conventional methods has had definite limitations, e.g., shapes have had to be relatively simple—flat like a windowpane, hollow like a tumbler or jar, or long and cylindrical like a fluorescent light tube.

Special design features, such as holes, grooves, or threads, have also been major "headaches" for glassmen. The glass industry has made many glass parts with these features, but in almost all cases it has been a slow and expensive operation. Commercial glassware has usually been redesigned to avoid the use of holes, threading, or grooving.

It has also been difficult with conventional glassmaking methods to hold close tolerances that could enable glass parts to compete with metal parts.

As a result of these limitations, the great bulk of the insulation field has remained outside the reach of glass. Corning's new Multiform process, however, has now made electrical glass available for insulation in a wide variety of shapes. This important development has come at a time when there is an urgent need for an additional supply of insulation, particularly in the communications field that is so important to our armed services.

The Multiform process involves a combination of cold-molding batch materials and subsequent fusing. Finished ware, in contrast with the more familiar types of glassware, is opaque or translucent, but it is a true glass. Products may now run the gamut from small insulating beads, several thousand to the pound, to large insulators weighing twenty-five pounds or more. Countersunk and tapped holes are practicable, as are both external and internal threads and grooves.

In addition to a wide range of shapes, sizes, and special design features, these products can be made accurately. General dimensional tolerances are as follows: large or heavy pieces, intricate shapes, and hollow cylindrical sections, $\pm 2.0\%$ or 0.010 in.; flat plates, solid rods,

disks, beads, and bushings, ±1.0% or 0.005 in. (except thickness, which should be ±4.0% or 0.005 in.). This glassware can be ground and polished to closer tolerances if necessary, and seals to other appropriate glasses can be made.

Multiform glassware can be made from almost any glass composition, the choice depending on the qualities required. Corning's glass No. 790, for example, combines the properties of very low thermal expansion, resistance to high temperatures, great chemical durability, and very low dielectric losses. This glass meets all the requirements of U. S. Navy Standard RE-13A-317F, Grade G, and is suitable for a wide variety of electric applications. Corning glasses Nos. 7761 and 707 also have very low dielectric losses and can be used as insulation at extreme frequencies. Laboratory tests have shown that all of these glasses and others will meet the proposed A.S.A. American War Standard on Radio Insulating Materials of Low Dielectric Constant, Grades L-5 and L-6.

ENGINEERING PROPERTIES OF PYREX MULTIFORM GLASS VS. OTHER INSULATING MATERIALS

Glass code Glass type Engineering properties	Unit	790 Multi-form glass	7761 Multi-form glass	707 Multi-form glass	774 Conventional glass	Steatites*	Electrical porcelains*
Density		2.15		2.10	2.23	2.5–2.8	2.3–2.5
Softening temperature	°C.				820	1250–1400	1500–1600
Maximum operating temperature	°C.	800	500	425	500		
Linear expansion (0 to 300°C.)	Per °C. × 10^{-7}	8.5		32	32	60–90	30–50
Water absorption (24 hr.)	%	<0.01	<0.01	<0.01	None	0–0.1	0–2.0
Modulus of rupture (annealed glass)	Lb./in.^{2} × 10^3	5	7	7	10		6–12
Modulus of rupture (special process)	Lb./in.^{2} × 10^3			12	18	17–24	
Volume resistivity							
Log R at 20°C.					14.7	14	12–14
Log R at 250°C.	Ohms/cm.^{3}	9.3			8.1	9–14	7–10
Log R at 350°C.		7.8			6.7	8–13	6–8
Specific inductive capacity (20°C., 1 mc.)		4.0	4.0	4.0	4.65	5.5 –7.5	5.0 –7.5
Power factor (20°C., 1 mc.)	%	0.18	0.11	0.10	0.42	0.03–0.20	0.70–1.2
Loss factor (20°C., 1 mc.)	%	0.72	0.44	0.40	1.95	0.15–1.24	3.5 –9.0
Dielectric strength	Volts/mil	>500	>500	>500	High	200–300	200–280

* Data from M. D. Rigterink, "Improved Ceramic Dielectric Materials," *Rev. Sci. Instruments*, **12** [11] 527–34 (1941); see *Ceram. Abs.*, **22** [2] 33–34 (1943) for abstract of this article.

PORCELAIN ENAMELED TANKS FOR DOMESTIC USE

Proposed Commercial Standard

On recommendation of a conference of enameled tank manufacturers and testing laboratories, we expect to send out shortly copies of a Proposed Commercial Standard for Porcelain Enameled Tanks for Domestic Use for consideration by testing laboratories, distributors, users, and others. It covers the so-called "glass-lined" tanks for range boilers, gas water heaters, electric water heaters, and domestic water systems, in sizes ranging from 15 to 80 gal. capacity.

It will be circulated along with an invitation to a general conference scheduled for 9:30 A.M., Thursday, April 22, at the Hotel William Penn, Pittsburgh, Pa., so that the draft may be considered and adjusted further to suit the desires of others directly concerned, such as water-heater manufacturers, public utilities, enamelers, users, and testing laboratories. We shall be pleased to send you a copy of the invitation and the proposed standard as soon as it is available.

—I. J. FAIRCHILD,
Chief, Division of Trade Standards,
National Bureau of Standards,
Washington, D. C.

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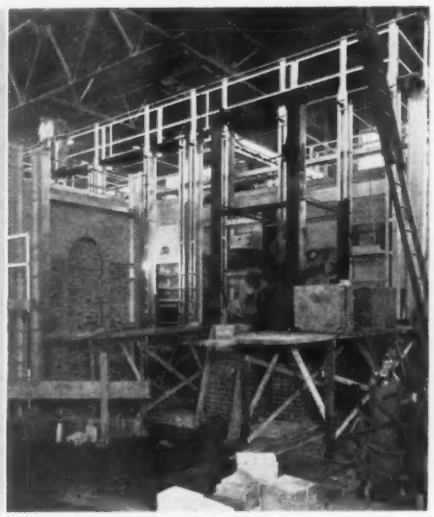

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INDUSTRY isn't crystal gazing in looking into the future—the post-war period. Industry has no time for mysticism and is not clairvoyant—but—it is planning for an unprecedented future, taking full advantage of the lessons of wartime production.

For instance, it is predicted that magnesium is destined to become one of peacetime industry's most useful materials.

In the famed Dow process, "Monofrax" one of the highly useful super refractories made by Carborundum, is extremely valuable in preventing the corrosive action of the charge along the metal lines of the cells.

Future developments in production of this metal will no doubt bring forth further applications of Carborundum Brand Super Refractories.

Now used chiefly in incendiary bombs, flares and airplane construction, magnesium undoubtedly will be more extensively used in the production of light weight, yet amazingly strong, structural alloys.

Synthetic rubber is another development on the threshold of history making production. And it has been found that in certain processes, special "Carbofrax" tile have helped to make possible faster and greater production.

The success of "Carbofrax" tile in this field is due chiefly to its high refractoriness and high heat conductivity and emissivity.

Extended uses for such strategic materials as zinc, vanadium and molybdenum are definitely in the plans for post-war developments.

In the production of all of these highly essential materials, super refractory products by Carborundum are already playing an all important part.

In so far as today's planning for tomorrow is concerned, the complete consulting, research and engineering service of the Refractory Division of The Carborundum Company is at your disposal.

No matter what your process may be, present or planned, if it calls for the application of super refractories, one or more of our many varieties will meet your specific condition.

If your requirements call for high refractoriness or high heat conductivity—if resistance to spalling and softening and if great strength at elevated temperatures are essential—there is a Carborundum Brand Refractory that will fill the bill.

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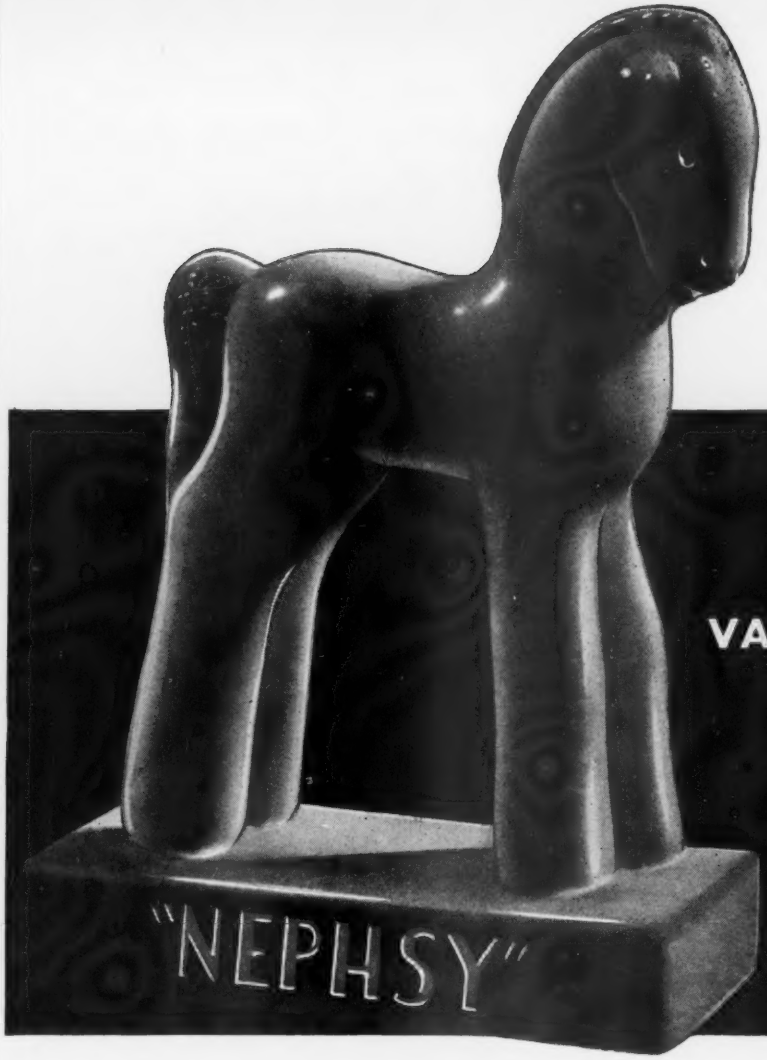
(Carborundum, Carbofrax and Monofrax are registered trade-marks of and indicate manufacture by The Carborundum Company)



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Ask us—our research department is constantly finding methods of improving ceramic ware. Consider these proven advantages of using Lakefield Nepheline Syenite.

GLASSWARE: As a means of introducing alumina into the batch it promotes easier melting—fusing at lower temperature—reduced melting time.

ENAMELS: ***Ground Coats***—Increases coverage—promotes adherence and lengthens maturity range—smelts readily with reduced smelting time at lower temperatures. ***Cover Coat***—Low iron content improves color. ***Mill Additions***—Increased fusibility eliminates defects, lowers cost.

WHITEWARES: ***Sanitary Ware***—Lower fusibility and lower maturing temperatures reduce losses. ***Floor and Wall Tile***—Lower absorption and reduced moisture expansion. Increased mechanical strength. ***Electrical Porcelain***—Longer maturing range with lower maturing temperatures result in uniform products.

LOW TEMPERATURE VITREOUS BODIES: Wide ranges of glazes and bodies are possible at Cone 4. Fine dinnerware manufactured with Lakefield Nepheline Syenite is translucent, and can be made with abrasion and corrosion resistant glazes.

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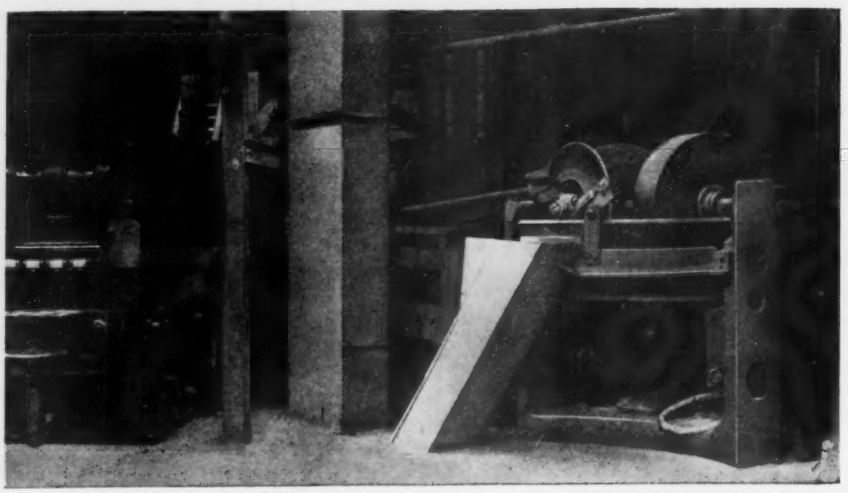

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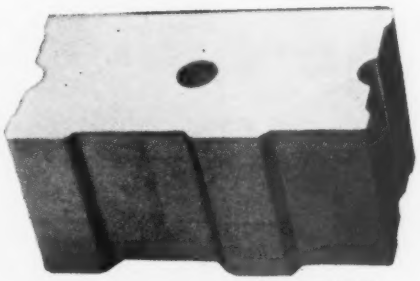

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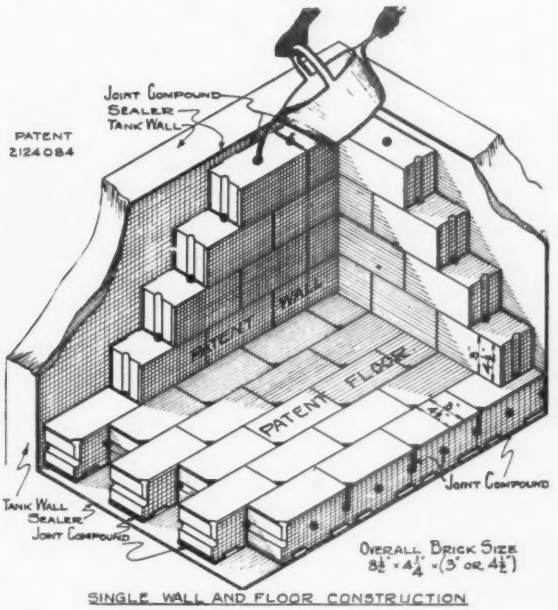

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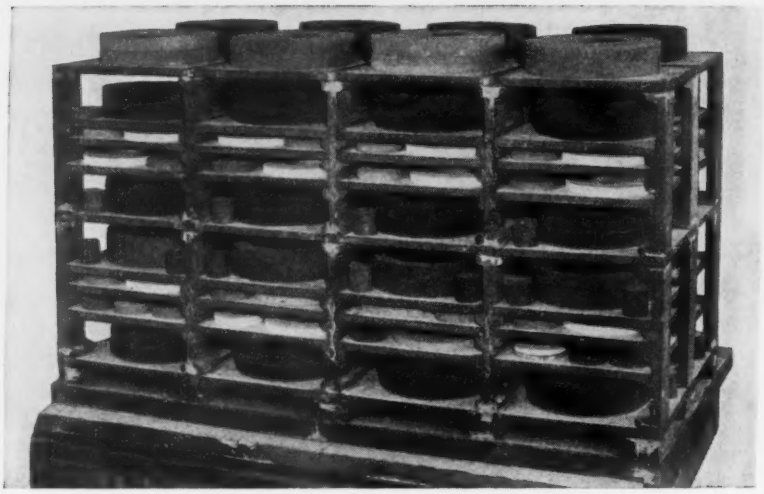

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¶ Broad statement? Positively not! Production records prove that less time and labor are required for loading and unloading grinding wheels than with any other type of kiln car setting.

¶ Only Electro's exclusive post design (patented shelf-type construction) makes this possible, because full slabs may be withdrawn (in tray fashion) without disturbing the rest of the load. REAL TIME ECONOMY!

¶ Composed of Kellogg AA silicon carbide, these posts are moulded at high pressure and processed at high temperatures. Through the greater strength and resistance to warpage thereby achieved, less frequent replacements and rebuilding of car super structures are necessary. MORE TIME ECONOMY!

¶ Flexibility of construction permits placing of slabs at varying heights to accommodate wheels of all thicknesses. Productive use is, therefore, made of the entire car. REAL SPACE ECONOMY!

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The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Gold Decorations
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
The Hommel, O.. Co., Inc.

Granulators
Lancaster Iron Works, Inc.

Grinding Wheels
Carborundum Co. (*Carborundum and Aloxite*)
Electro Refractories & Alloys Corp.
Norton Co. (*Alundum-Crystolon*)

Hearths
Carborundum Co. (*Carbofrax* heat treating)
Corhart Refractories Co.
Norton Co. (*Crystolon*)
Taylor, Charles, Sons Co.

Hearths (High Aluminous Clay, Electrically Sintered Aluminum Oxide, Silicon Carbide)
Carborundum Co.
New Castle Refractories Co.
Norton Co

Hydraulic Propellers
Denison Engineering Co.

Hydrofluoric Acid
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Iron Chromite
Ceramic Color & Chemical Mfg. Co.
Harshaw Chemical Co.

Iron (Enameling)
American Rolling Mill Co.

Iron Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Foote Mineral Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Kaolin
Ceramic Color & Chemical Mfg. Co.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Paper Makers Importing Co., Inc.
United Clay Mines Corp.
The Vitro Mfg. Co.

Kilns, China (Decorating)
Drakenfeld, B. F., & Co.
Frazier-Simplex, Inc.
Harrop Ceramic Service Company
The Hommel, O., Co., Inc.
Swindell-Dressler Corp.

Kilns (Electric, Circular, Tunnel)
Harrop Ceramic Service Company
Swindell-Dressler Corp.

Kiln Furniture (Silicon Carbide, Semi-Silicon Carbide) (Refractory)
Carborundum Co.
Electro Refractories & Alloys Corp.
Taylor, Charles, Sons Co.

Kryolith (see Cryolite)
Pennsylvania Salt Mfg. Co.

Laboratory Ware
Norton Co

Lehr Tile (High Aluminous Clay, Electrically Sintered Aluminum Oxide, Silicon Carbide)
Carborundum Co.
Electro Refractories & Alloys Corp.
New Castle Refractories Co.

Lehrs
Frazier-Simplex, Inc.
Swindell-Dressler Corp.

Lehrs (Electric or Fuel Heated)
Frazier-Simplex. Inc.
Swindell-Dressler Corp.

Lehr Loaders
Frazier-Simplex, Inc.

Linings (Furnace Refractory, Block Refractory Plate, Brick, and Tile)
Carborundum Co.
Corhart Refractories Co.
Electro Refractories & Alloys Corp.
Green, A. P., Fire Brick Co.
Ingram-Richardson Mfg. Co. of Ind., Inc.
Norton Co.
Taylor, Charles, Sons Co.
The Vitro Mfg. Co.

Lithium Carbonate
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Foote Mineral Co.

Lithium Minerals
Foote Mineral Co.

Loaders (Bucket)
National Engineering Co.

Magnesia (Fused)
Electro Refractories & Alloys Corp.
Norton Co.

Magnesia (Sintered, Calcined)
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.

Magnesite
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Foote Mineral Co.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Magnesite Calcined
Ceramic Color & Chemical Mfg. Co.
Foote Mineral Co.
The Hommel. O., Co., Inc.

Magnesium Carbonate
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Manganese
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Manganese Dioxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Foote Mineral Co.

Manganese (Oxide)
Ceramic Color & Chemical Mfg. Co.
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Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
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Foote Mineral Co.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

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Muriatic Acid
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Needle Antimony
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Foote Mineral Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Nepheline Syenite
Great Lakes Foundry Sand Co.

Nickel Salts
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Nitrates (Cobalt, Sodium)
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Nitre
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Harshaw Chemical Co.
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Olivine
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Opacifiers
Ceramic Color & Chemical Mfg. Co.
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Overglaze Colors
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Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.

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Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
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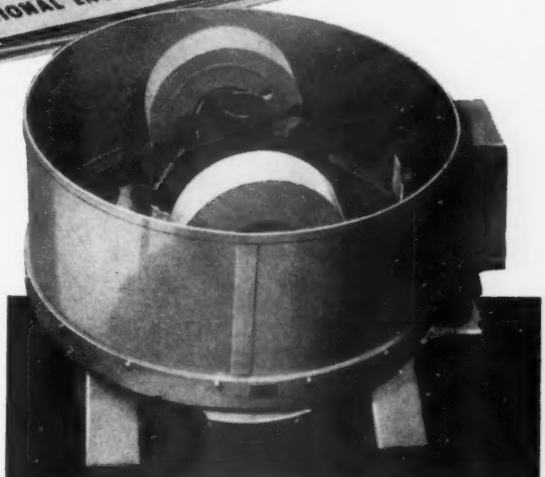

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Norton Co.

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Electro Refractories & Alloys Corp.
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Foote Mineral Co.
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Harshaw Chemical Co.
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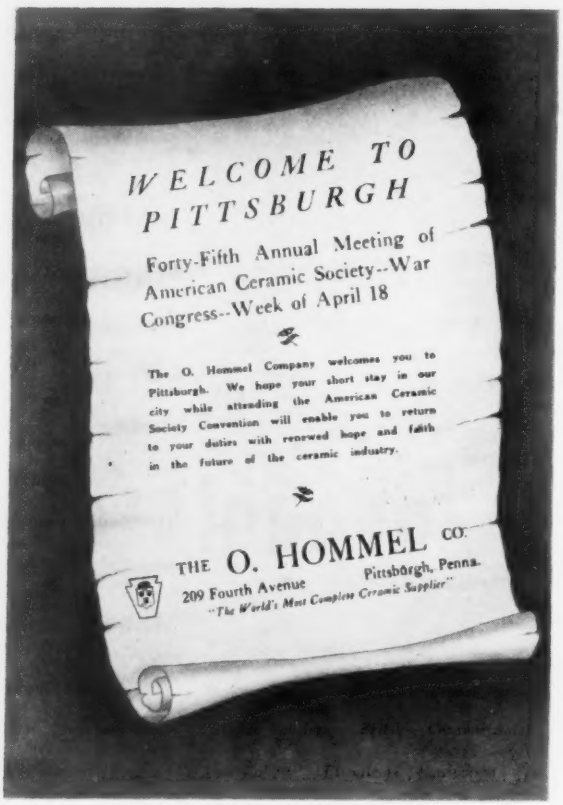
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We—at Bonnot—like all of you—have been diverted from much of our normal production and service. There was no choice. Like you, we are proud of our contribution to Victory—even though it has largely interfered with the much more agreeable business of serving you on a normal basis.

But our plans, our development, our research work are still directed—as our staff is determined—to meet your needs in the post-war situation.

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